THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD: COPPER AND BRASS: THE BRASS FOUNDER AND FINISHER:

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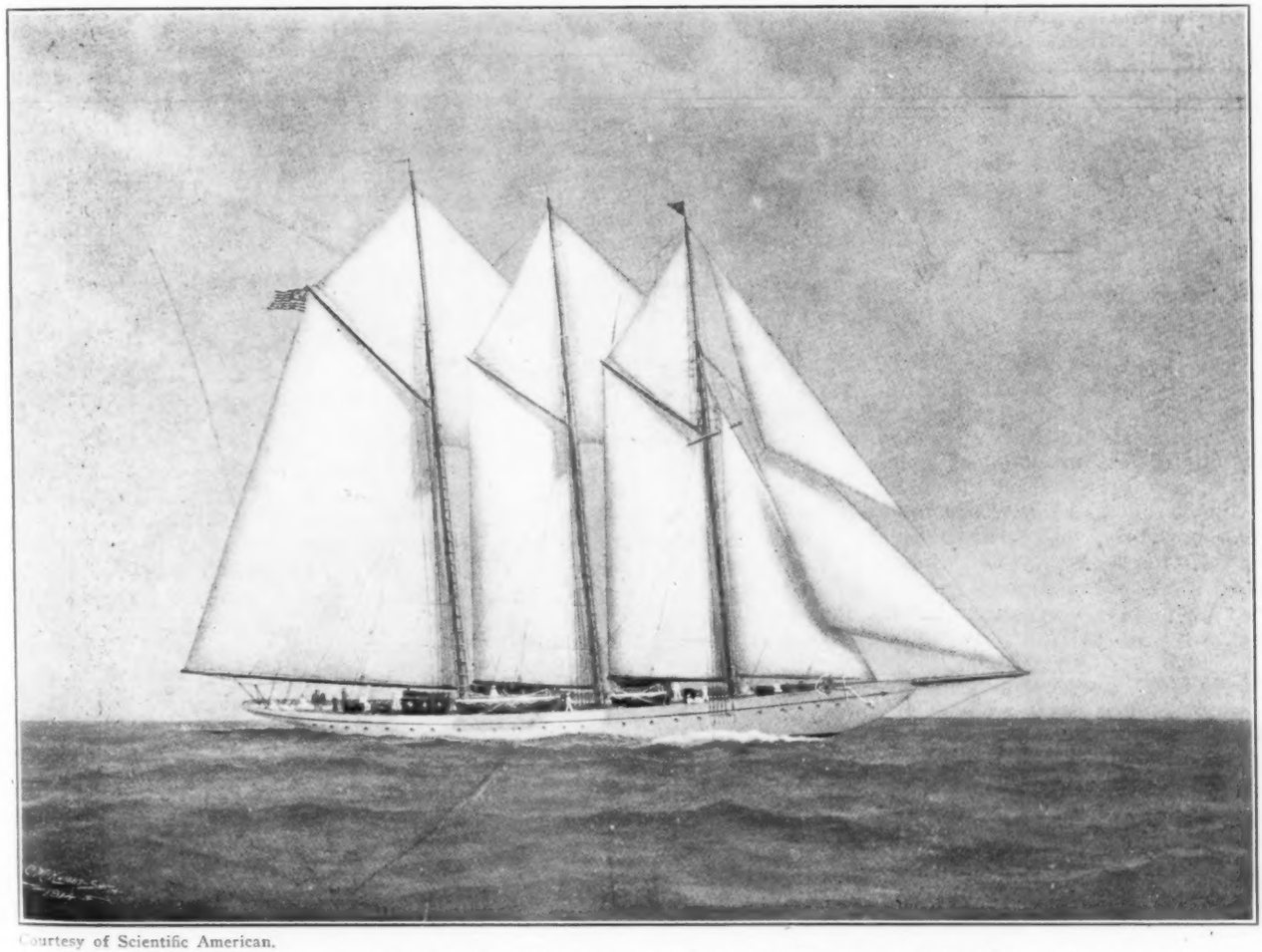
A MONEL METAL BOAT

A BRIEF DESCRIPTION OF THE THREE-MASTED AUXILIARY SCHOONER YACHT "SEA CALL."

The yacht shown in the cut was recently launched at the shipyards of George Lawley & Sons, Neponsett, Mass., and is the largest fore and aft schooner yacht afloat. The principal dimensions of the new boat, "The Sea Call," are: Length all over, 214 feet; length on load waterline, 150 feet; beam, 33 feet 6 inches, and draft, 18 feet. Built houses on the deck, plainly seen in the photograph, are also constructed of the same metal. The employment of this metal for this purpose is an interesting application for monel metal although it is not exactly new. Monel metal has been used for some time in marine construction because of its superior resistance to the corrosive action



Courtesy of Scientific American.

THE "SEA CALL," LARGEST FORE AND AFT AUXILIARY SCHOONER YACHT AFLOAT WITH MONEL METAL PARTS.

for ocean cruising, she is equipped with a complete sea-going rig, including square sail on the foremast, three head sails forward, a short mizzen boom and a gaff for off-shore work.

The principal point of interest for readers of THE METAL INDUSTRY in the new boat lies in the large use, in her construction, of metals other than iron and steel. The plates of her hull, as well as a large number of nuts and tie rods are made of "monel" metal and the two by salt water. The metallurgical world will watch very closely the results of the use of this metal, especially as no protective covering, such as pitch or paint, has been put on so far. Another boat using a large amount of the non-ferrous metals was the "Carnegie," built in 1909 by the Carnegie Institute, Washington, D. C., for use in the Goedetic Survey, and was supposed to be entirely non-magnetic. This boat was described in THE METAL INDUSTRY January, 1909.

TREATMENT OF WASTE MATERIAL CONTAINING SILVER*

A Detailed Description of Methods Pursued by a Large Silver Shop in Recovering the Precious Metal.

By R. J. Marsh.

This article is to deal largely with the preparation for smelting and refining of the various silver-containing waste materials that are produced in a factory manufacturing silver goods. It will be of interest to the manufacturer producing these materials, not so much because they might wish to smelt them themselves, as because they can dispose of them to much better advantage to smelters, and can be surer to get their full value if they are previously treated as described in this article.

These waste materials consist mainly of three classes, each of which has to be treated in a different manner. First—sweeps, in which are classed worn out polishing materials, lint and rouge from dust collectors, sweeps from floors, sludge from settling tanks, old crucibles, slag, etc. Second—filings, grindings or shavings containing silver. Third—solutions, both nitric and sulphuric acid, and also old plating solutions.

SWEEPS.

The first class is much the largest and will be treated first in this article. It is impossible for the small manufacturer and impractical for even the larger ones to smelt these materials, and obtain the pure silver again. This smelting is only done by a few of the larger buyers of silver sweeps. These sweeps cannot be smelted in small lots, but the materials from a large number of manufacturers must be mixed together to get a lot large enough to smelt, and in order that the smelter may pay each the true value of his sweeps, it is first necessary to obtain an accurate sample of each lot of dirt, assay same, and find the amount of silver in each lot. Owing to the high value of silver it is necessary that these samples be very accurate, and as it is impossible to accurately sample green sweeps (as they are called before being burned) they must first be treated to get them into a form in which they can be accurately sampled. As ordinarily saved, these materials are either oily, as in the case of polishing materials, wet, for example, sludge from settling tanks, or in large pieces, as in old crucibles. The first operation, then, is to burn or dry the materials. This must be done slowly, with as little draught as possible, owing to the danger of valuable dust, containing silver, being carried off up the flue and being lost. In all the larger treating plants the flues from burning furnaces are all led into large settling chambers where the velocity of air is decreased, and any dust being carried off is deposited. These are cleaned out occasionally, and even where the draught is kept as low as possible, considerable silver is found in these chambers.

BURNING THE REFUSE.

For the burning of these materials only a very simple type of furnace is necessary. An ordinary square or oblong brick chamber, connecting with a chimney and having some sort of a grate a short distance above the floor is satisfactory. The size of the chamber depends on the size of the lots of sweeps to be burnt in it, varying from two to three feet square up to six or eight feet. In the case of the refiner, where sweeps from different owners are to be treated, it is preferable to have the grates removable, and furnace large enough so that a man can get into it easily, brush down walls, and sweep out thoroughly between batches. A very satisfactory grate is made or ordinary iron pipes or rods run in from the front through a perforated iron plate set in the furnace wall. Sweeps from the dust collectors from exhaust systems of buffing and polishing rooms have merely to be dumped into the furnace and touched off with a match. If it is not necessary to hurry matters, it is better to leave this entirely alone until it is burned out and cold. It does not need to be stirred in order to burn it thoroughly, and the stirring while it is still burning, or even hot allows dust to escape. It takes considerable longer to burn it without stirring, but if material is not more than a foot to a foot and a half deep, it will burn in 24 to 36 hours.

Most of the other kinds of sweeps will not burn readily by themselves, and with these it is necessary to build a small wood fire first. When this is blazing well, the sweeps can be shovelled on. It is important not to build too fierce a fire to start with, because the draught from such a fire will carry off too much dust. This point cannot be over-emphasized, especially if the furnaces are not equipped with a dust collecting chamber. Where the quantity of sweeps is very large it is better not to put it all on at once, but put on part of it, and allow this to get burning well and thoroughly heated before putting on the rest. When material is entirely burned and cooled, if it is possible to leave it in the furnace this long, the grates can be shaken or in case rods are used, these can be pulled out and burnt sweeps cleaned out of the furnace.

Old crucibles, clinkers and similar materials, if kept by themselves and away from water or oil will not have to be burned. Sludge from settling tanks, sawdust, etc., cannot be burned in above described furnaces, but must be dried before burning. Where considerable quantities of these materials are to be dried, it is usual to have some cast iron drying pans heated by fuel, oil or coal. For smaller quantities a gas heated pan is sometimes used, and a very economical way is to have a pan so arranged that the heat from other sweeps burning may be utilized to dry out these wet materials. After they are dry they can be set on fire to burn out sawdust, excelsior, and other combustible matter right in the pans themselves, or they can be transferred to the previously described furnaces and be burnt there. In many manufacturing plants large muffle annealing furnaces are used for annealing the work in the process of manufacture, and if these are not filled with regular work over night, a very good way to dry and burn these dirts is to have some water tight pans, fill these with the material, and after the fires are shut off at night, push these pans into the hot muffles. The heat remaining in the muffle walls will be sufficient to dry and burn the dirts perfectly.

CRUSHING AND SIFTING.

After these materials are dried and burnt they will be caked together, and contain pieces of metal, stones, nails, etc., and cannot be satisfactorily sampled in this condition. The next step is to crush and sift these materials to a uniformly fine powder. The processes described up to this point have not changed markedly in many years, but in this crushing and sifting operation a marked improvement has been introduced within the last few years. This improvement consists in the introduction of a labor and time saving device for performing this crushing and sifting. In order to get an accurate sample it is necessary to put the sweeps through a very fine mesh screen, a screen of 60 meshes to the inch being the size commonly used, and as fine as 80 is used in some places. The finer the mesh, the surer one is to get an accurate sample.

*A companion article to this one, "Recovery of Precious Metals from Jewelers' Wastes" appeared in The Metal Industry, January, February, March, April and May, 1909.

In the past it was customary to run the material through a sifter, take the coarse material not going through, put it into a crusher and after crushing for 10 or 15 minutes, discharge same, sift again and repeat as long as there was any material left that was capable of being crushed further. The sifters used were of one or two types. First, a rotating screen, consisting of a tube of brass wire cloth, either circular or six or eight sized in cross section, rotating on its axis that is slightly inclined, so that if the material is fed in at the upper end, it will work down through, and the coarse material will fall out of the lower end. Second, a shaking screen, operated by an eccentric, which shook an inclined screen rapidly to and fro. With this type, material was fed on to the upper end and the coarse residue rattled off the lower end. With both types it is necessary to adjust speed of movement to the conditions applying at that particular plant. If too fast, material will not go through screen, and if too slow maximum efficiency will not be attained. The speed should be as fast as possible and still have no fine material come through with the coarse. It is impossible to give definite speeds here, as they will vary with diameter of screening cylinder, inclination and mesh of screen, and fineness of crushing. These screens are largely home made, each user making his own, and it is easy, by a little careful attention, to get efficient results. It is probably unnecessary to state that the screen should be entirely encased in a box of some sort to prevent dust from escaping, as attention has already been called to the importance of avoiding dust as far as possible. A good way is to have course material fall into a drawer, that can be pulled out and taken to the crusher, and another put into the sifter to take its place.

STYLES OF CRUSHERS.

The varieties of crushers used are numerous, although until recently the kind generally used was a type similar to the well known cinder crusher used in crushing copper bearing cinders, etc. It is a double cone shaped casing two or three feet in diameter at larger part, tapering down at ends. In the inside there is a double coned casting similar in general shape to the casing. In some machines this casting is a solid piece, in others it is made of two separate cones linked together with a heavy iron link. The latter is the most efficient. As the crusher revolves this casting is free to roll in the casing, and it crushes the material between itself and the walls of the casing, and in the case of the two separate cones, between the ends of the cones. The machine is driven either by gears on circumference of casing, or by a pair of roller bearings.

As will be readily seen, after such a machine was filled with material to be crushed and run a few minutes, the fine material formed in the crushing would act as a cushion, and protect the remaining material so that it would be crushed only very slowly. It was then necessary to dump crusher, sift dirt, and return coarse dirt to the crusher for another treatment. To avoid losing material in the form of dust, these crushers were inclosed in board casings, and every time they were charged it was necessary to open door of casing, stop machine, remove cover to charging hole, shut door to casing, start machine, run two or three minutes to discharge material, stop machine, open door to casing, shovel up dirt and transfer to sifter. As can be seen from description this was a long and laborious method.

Within the last two or three years, machines have been introduced to do the crushing and sifting in one operation. They are not all new machines, built especially for this purpose, as some of them have been used for a long time on other materials, but only recently have they begun to be utilized for the treatment of this material. There are several of these machines on the market now, at least one good foreign built machine and one of American make. The principle of these is that the crushing is done in an inner chamber, either by means of a heavy casting, as in the old type of crushers previously described, or by means of a quantity of iron balls, usually the latter. The iron plates against which they do the crushing are perforated, and the crushed dirt falls through these perforations against the fine screen. Any material not fine enough to go through the fine screen is automatically returned by the revolution of the machine to the crushing chamber, and is again worked upon by the balls. Fresh material can be continually fed in, and no cleaning or discharging is necessary until all the dirt is sifted. The dirt as it is sifted can be automatically discharged into a barrel or box to stay there until it is wanted for sampling. When all fine material is out of machine, power is shut off, barrel of fine material is removed, and by opening a small slot in machine and starting the power again, all uncrushed material such as nails, buttons, shots of metal, etc., can be discharged. Practically nothing but pieces of metal will remain uncrushed in such a machine.

One thing regarding this machine should be mentioned. When using the same mesh screen in such a machine as in the old style, the dirt will not run as fine as that sifted in the old style way. In this machine, just as soon as a particle of dirt gets small enough to go through the screen it does so, while in the old method it goes on being crushed as long as it stays in the crusher, and a larger proportion is crushed much finer than is absolutely necessary to go through the screen. This is not at all a serious objection, and even if it were it could be overcome by using a little finer mesh screen.

It is certainly evident that a large proportion of the time and labor formerly used in crushing and sifting can be saved by a machine of this type. It is, of course, a more expensive machine to install, but if there is any quantity of work to be done, it will soon save the difference in original cost. Any materials such as hard slag, old crucibles, etc., are easily worked up in it if first broken to pieces two or three inches in diameter.

METHODS OF SAMPLING.

After sifting comes the all important operation of sampling. This is naturally the most important, and requires the most careful attention of any operation in the treatment of the sweeps, for on the results of this are based the amount to be paid for the sweeps, and in this both the manufacturer and the refiner have a vital interest.

There are at least 4 methods of sampling being used at the present time. Of these the oldest and simplest is perhaps the most liable to give erratic results. It consists in shoveling the sweeps over and over on the mixing floor until they are considered to be thoroughly mixed, and when they are then being shoveled into barrels a spoonful is taken from each shovelful. If the sample taken in this way is too large it is cut down by mixing sample thoroughly, and taking out spoonfuls enough to give necessary sample. The danger in this method is largely that the mixing is not done thoroughly enough. The necessity for extreme accuracy in sampling will be realized if it is understood that the final sample taken for assaying is not over 6 grams, or approximately 1/75 of a pound, so that any error in this sample must be multiplied by 150,000 for every ton of sweeps being treated.

The second method, much more widely used than the above, is the cone and quarter method. In this again the material is mixed by shoveling over and over on the floor. The best method of doing this mixing is to shovel

material into a cone, placing each shovelful on the apex of the cone, so that it will roll down equally on all sides. To insure thorough mixing the sweeps should be coned in this way at least four or five times. After the last coning the pile is divided as carefully as possible exactly through the center into four equal segments or quarters. The opposite two of these are put one side, and the remaining are shoveled into a cone, and the cone is again divided into quarters, and this process is repeated until only enough is left for a sample. The essential parts to this method are thorough mixing, careful coning, being sure while making cone to keep the apex of cone always in one place, and taking care to divide cone so that the point of each of the four quarters comes at apex of cone. The process of coning tends to sort the sweeps to a slight extent, the coarser, light material tending to roll farther down the pile, while the heavier shots of metal tend to stay nearer the apex, so if this apex is not evenly divided when material is quartered an incorrect sample is obtained. This method has been, and is, largely used, and in careful hands is capable of giving good results.

The third method of sampling is carried out by means of a riffle sampler. This is a device so constructed that it can be set on top of two barrels or cans, and consists of a series of chutes inclined at an angle of 60° with the horizontal. There should be an even number of these chutes. They are arranged alternately, so that the first one leads into one barrel, the second into the other, and so on. Excepting the top and bottom openings the chutes are all enclosed so as to avoid the loss of dust. The top and openings are parallel and side by side, with nothing but the walls of the chutes between. The openings into the chutes are surrounded by a raised rim two or three inches high, thus forming a receiver to shovel the dirt into. A convenient size to make the chutes is so as to have opening to each chute 1 inch wide and 10 or 12 inches long, and, as each sampler should have 10 or 12 chutes, the receiver made by rim mentioned above will be 10 or 12 inches square. From above description it will be easily seen how the sampler operates. The dirt is shoveled into the receiver on top, using a shovel as wide as the combined width of the chutes, so that it will discharge approximately equal amounts of dirt into each of the chutes. The dirt will immediately be divided into 10 approximately equal parts by the ten chutes, and will fall through them into the barrels, five parts into one barrel and five parts into the other. Using this sampler if the dirt is anywhere near uniformly mixed, it is hard to imagine the part going into one barrel as being very different from that going into the other. When the entire lot of sweeps has been put through the sampler once, one-half of it can be set aside as finished, the other half is put through again, dividing it into two equal parts, and this dividing is continued until a lot small enough for a sample is obtained. The last one or two divisions can usually be done easier with a smaller sized sampler. This method has the advantage over the preceding one of being more accurate in the hands of an inexperienced or careless man, and fully as accurate under any circumstances. It does not require thorough preliminary mixing, thus saving labor, and when material is sampled it is already in barrels ready to dispose of, thus again saving labor. It is unnecessary to mix the dirt more than twice in this method, unless the lot being sampled is made up of a number of smaller lots of widely varying values.

The fourth method of sampling has been recently introduced, and is reported as giving very good results. In this the sweeps are placed in a large mixing machine, which is then revolved for from two to eight hours, depending on the size of the batch to be sampled. This thoroughly mixes the dirt, so that as it is discharged into barrels any sample taken out will fairly represent the entire lot. This method will certainly be labor saving, if the machine will mix the dirt as thoroughly as it is claimed to do, and it seems very reasonable that it will do so. It has the disadvantage, however, of high initial cost, which makes it less practical for the small user than for the large refiner.

ASSAYING.

The next step in the treatment of the sweeps after the sampling is the assaying. This will not be described here in detail. It is sufficient to say that the refiner will assay his sample and pay for dirt on the basis of this assay. He does not refine each lot separately, and weigh the silver recovered, as this is not a practical way to do. If it is the manufacturer that has prepared the sweeps and taken the sample, he can use it in either of two ways. First, ship his sweeps to whatever refiner he desires to, and at the same time have his sample assayed by a competent assayer, thus checking up returns from the refiner. Or, he may send out parts of this sample to different refiners, asking them to submit bids on a certain day, giving them time enough to have assays made.

TREATMENT OF FILINGS AND GRINDINGS.

As to the second class of materials, that is, filings, grindings, etc., rich in silver, these materials can either be refined to pure silver or can be gotten into a shape so that they can be accurately sampled, and can then be sent to a refiner for treatment. The latter way is usually the cheaper, as the charge for refining such material is not high.

It is usually best to burn these materials first, to burn out oil, glue, dirt and all combustible matter. This can very conveniently be carried out by placing in a pan in an annealing furnace, or if this is not available, over a gas burner, or the top of a crucible melting furnace. One method of refining considerably used, especially on lots low in silver and rich in copper, brass or German silver, is to treat the material with nitric acid, about 4 parts acid to one part water, using only enough of the mixture to dissolve the metal completely. After this is accomplished, this solution is treated exactly as will be described later under the treatment of acid silver solutions. This method is expensive, owing to cost of acid and labor necessary, and should only be used on small lots, or on material containing a small proportion of silver. It yields, if properly carried out, a very pure silver.

MELTING THE GRINDINGS.

A second method is to mix the burnt grindings with a flux, place the mixture in a sand crucible and melt, remove the crucible, let it cool, break and find the button of pure silver in the bottom. Fluxes can be bought specially prepared for this purpose, but they can be made at home more cheaply. A mixture of soda ash, borax glass and saltpetre will answer very satisfactorily. The proportions of the ingredients vary with the material being treated. The more copper and other foreign metals there are present, the greater will be the proportion of saltpetre and borax glass that will have to be used. A good flux for ordinary work on sterling silver grindings is three parts soda ash, one part borax glass, one to two parts saltpetre. The flux that it is necessary to use with the different kinds of materials will vary in quantity also, depending on amount of dirt, emery, etc., present. A material rich in silver will need only one part flux to two parts grindings, while a poorer one should have as high as to or even three parts flux to one part grindings. Borax must not be used in place of borax glass mentioned above, as it contains water, which on heating swells up the borax, and would force a large part of the charge

out of the crucible. Borax glass is merely borax that has been heated to drive off this water, and in this heating it melts to a glass-like substance. It should be bought in the powdered form, at least as fine as 40 to 60 mesh. The slag from these crucibles should be saved, as it will contain enough silver to pay for refining. This method also is expensive, both for flux and crucibles.

A third method, better in most cases than either of the above, is to melt the grindings down to a metallic ingot, making no effort to remove copper and other metals, analyze same, and have it refined either by cupellation or electrolytically. To get the grindings into ingot form it is only necessary to melt same with a flux in a graphite crucible, pouring the resulting metal into a mould. The crucible can be used time after time, and the flux necessary is an inexpensive one. One that will give perfect satisfaction is composed of three parts soda ash, and one part borax glass. Saltpetre is not used in this case as its function is to remove foreign metals, and this we are not trying to do now. Saltpetre must not be used in a graphite crucible as it will destroy them very rapidly. With filings or material very rich in metal it is not necessary to use so much borax glass. This flux should be thoroughly mixed with the grindings in the proportions of one part of flux to 3 parts of grindings. In case the mass does not melt down readily, and separate into metal and flux, use a larger proportion of flux, and if this does not remedy the trouble, use more borax glass in the flux.

SAMPLING THE SILVER.

In case it is wished to have the silver analyzed to check up returns from the refiner, it must now be sampled. Samples can be taken by drilling or by dipping. In case the drilling method is used, a number of holes should be drilled through each bar, and the drillings mixed for analysis. A dip sample is obtained by remelting the silver, stirring it thoroughly, and taking out a little ladle full, pouring it into cold water in a fine stream. This method is much more accurate than the drilling method, for in cooling a mass of molten silver there is a tendency for the alloy to separate to a certain extent into its component metals, thus causing some parts of the bar to be richer in silver than others. Dip samples are the only proper ones, and should always be used where the quantity of silver is large, especially where the percentage of silver in the ingot is low, as in this case the separation is apt to be greater. After the metal is obtained in ingot form it can be shipped to the refiner, and if it is so desired, he can be asked to test same and report on value before refining. Then if his report is not satisfactory, the material can be sampled again, and in this way there is no danger of any serious disagreement.

TREATING RICH SOLUTIONS.

The last class of silver containing material to be described in this article is that of solutions, both acid and old plating baths.

The acid solutions are either nitric or sulphuric acid solutions, or a mixture of both. While these can be treated in several ways, the most practical, and the one which will give the purest silver, is the one that will be described first. A strong solution of common salt is added to the solution, causing the silver to be precipitated as a white curdy mass that will after a time settle to the bottom of the jar. The salt solution must be added until no more precipitate is formed, then the solution is let stand until it has settled and is clear. The clear solution should then be siphoned off and fresh water, using it hot if this is available, be added, the chloride stirred up, allowed to settle again, and this process is repeated until all acid is washed out, three or four washings being sufficient. After the last siphoning a few pieces of scrap iron are added, and enough oil of vitriol to start a little action on the iron. The mass is stirred from time to time until the color has changed from white to gray, this denoting that the chloride has all been changed to metallic silver. The remaining pieces of iron are pulled out, and the silver is washed the same as the chloride was, only more thoroughly, four or five washings being advisable. After it is washed it is dried and melted with a little flux. This will give a very pure silver, satisfactory to use for any purpose.

Another method that might be mentioned is to add strips of copper directly to the original solution. The silver is deposited on the copper and can be scraped off, washed and melted, but it is not as pure as that obtained the other way, and the cost of the copper is considerable.

Old plating solutions can be boiled down until dry and residue treated like sweeps, but this method is not very satisfactory. They can also be treated with oil of vitriol, which throws down the silver as a precipitate, similar to silver chloride. The clear solution is poured off, and precipitate is dried and treated as sweeps. In some cases it is possible to wash and treat this precipitate as described above with iron and acid, but in most cases the precipitate contains many things besides silver chloride, and this treatment does not work well. Great care must be taken in adding oil of vitriol to a cyanide plating solution, as it sets free the very dangerous hydrocyanic acid gas (sometimes called Prussic acid). This operation must never be done except where there is a strong draught, and only by a person who realizes the danger.

ZINC PRECIPITATION OF SILVER.

There is one other method of treating these solutions, long used in the mining industry, but only recently applied to plating solutions. That is, precipitation with zinc dust. Zinc dust consists largely of finely divided zinc, and if this is sifted into a cyanide silver solution it precipitates out the silver, which settles to the bottom, and can be washed, dried and melted. This method is certainly the easiest, safest and most satisfactory manner of treating these solutions. Care must be taken to use plenty of the zinc dust so as to be sure to precipitate all the silver. An excess will do no harm except that it wastes the zinc, and so increases cost. After washing the precipitated silver twice with water, some oil of vitriol should be added to take out the excess zinc, and then the silver is washed free of acid, dried and melted. Silver recovered in this way will not always be absolutely pure, but if it is not it can be sent to a refiner and purified at small cost.

The manufacturer who adopts the above methods of treating his waste materials that contain silver can certainly be sure of receiving their full value when he disposes of same. The reputable refiners are undoubtedly giving fair and correct returns for sweeps purchased by them, but it will be, at least, a satisfaction to a manufacturer to positively know that he is dealing with a reputable refiner, that he is getting fair returns, and that he cannot suffer even by a mistake on the part of the refiner.

NO ALUMINUM FOR FUSES IN FRANCE.

A writer for one of the New York daily papers in the course of a report made after a trip abroad states that on inspecting the metal works at Bourges, France, he saw no sign that aluminum was being used in fuses and shell-heads, as is admittedly the case in Germany.

COPPER ALLOYS WITH NOTES ON BRASS FOUNDING*

AN ADDRESS DESCRIBING SOME OF THE FUNDAMENTAL PRINCIPLES OF ENGLISH METAL MELTING.

BY H. L. REASON.†

The first thing for consideration in a brass foundry was the furnace, because badly designed furnaces and chimney stacks caused endless trouble. To secure good work copper alloys must be melted as quickly as possible, care being taken to avoid overheating and burning. Not only did metal deteriorate by being in the furnace too long, but a good deal of undue wear and

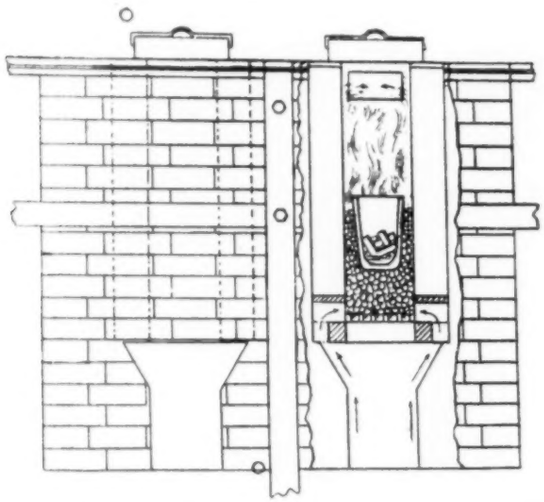


FIG. 1. BRASS MELTING FURNACE, PIT TYPE. FRONT VIEW.

tear was put upon the crucibles. Furnaces should always be kept in a good state of repair like the cupola. When a furnace begins to wear and belly out, increased

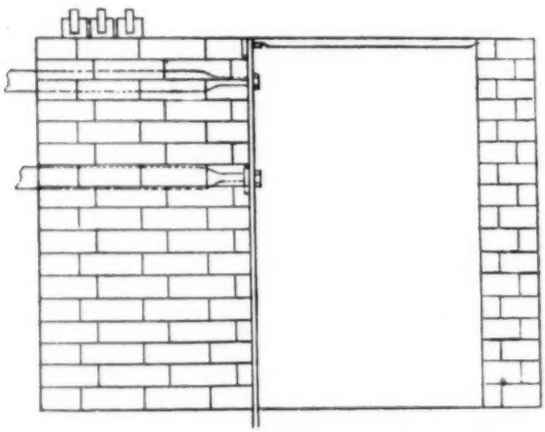


FIG. 2. BRASS MELTING FURNACE, PIT TYPE. SIDE VIEW.

coke has to be used, while another detrimental effect in connection with the brass furnace is that, instead of having a uniform heat round the pot, the increased coke space makes the bottom of the furnace much hotter, and sets up a terrible cutting action on the crucibles. The author said that he had seen crucibles ruined after doing five or six heats. The men brought them and complained about the quality of the crucible when the injury was really due to the intense cutting heat caused by the enlarged furnace. The author proceeded: "I prefer the brick built furnace (see Fig. 1). If properly designed there is very little heat radiation, and as men have to work over the top of them that is an important matter in the summer time. Stopping the radiation of heat must lead to more economical melting."

Slides were exhibited showing two furnaces designed by the author, in which the fire bars were made to rest on the bearer, leaving air space between the bottom of the lining and the fire bars. An iron plate with a square hole was introduced to carry the lining, and the furnace was tied together by wrought iron stays. The end view (Fig. 2) showed the rod coming through from the bank, and also the tee iron carrying the grating. The height from the floor to the underside of the grating should be 5 feet 6 inches to 6 feet. In a line of furnaces this arrangement would enable a man to walk from end to end for the purpose of cleaning out, and this could be done without lifting the gratings. In Birmingham the majority of furnaces were built in this way to stand above the floor level.

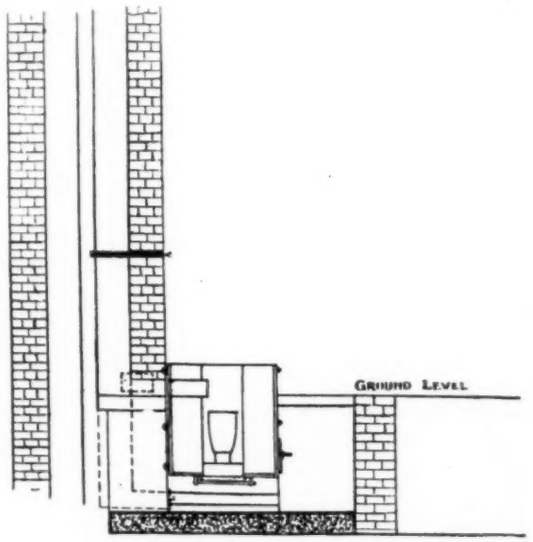


FIG. 3. 70-LB. HIGH PRESSURE GAS FURNACE.

Coming next to more modern methods of melting metals, the author exhibited a series of views of high pressure gas furnaces of various types. It was explained that several brass foundries in Birmingham have adopted high pressure gas furnaces, and for the supply of these the Corporation gas department have twenty miles of high pressure gas mains laid. The advantages of such furnaces over coke furnaces are that the metal is melted in a reducing atmosphere, and is not subjected to the sulphur fumes of the coke, while less oxidation takes place, the foundry is cleaner and there is no trouble to cart away coke and ashes. The only disadvantage is that such furnaces are very noisy.

A slide was exhibited showing a sectional elevation of a high pressure gas furnace in position (Fig. 3). The crucible was placed on a pedestal so as not to come in direct contact with the flame from the burner. In this type of furnace a damper is necessary for regulation according to the climatic conditions. By the careful use of this the highest efficiency can be secured. The burners require no adjustment after being regulated and fixed.

Calling attention to a view of a reverberatory furnace,

*Extracts from a lecture delivered before the Birmingham Branch of the British Foundrymen's Association, Birmingham, England.

†Birmingham Brass Founder.

the author explained that where large quantities of metal are required, air or reverberatory furnaces are employed, and the one exhibited had just been brought to his notice. The fuel for such furnaces was hard coal at the rate of half cwt. per cwt. of metal melted.

The capacity of the furnace was 3½ cwts., and it was possible to melt six or more heats per day, though the average would be less by two or three per cent., according to the grade of metal. Such a furnace would work six months in constant use without being re-built. A sectional view of the furnace (Fig. 5) showed the fire doors, the fire bars and the fire space, and indicated the position at which the metal rested while undergoing melting from the heat passing over the top.

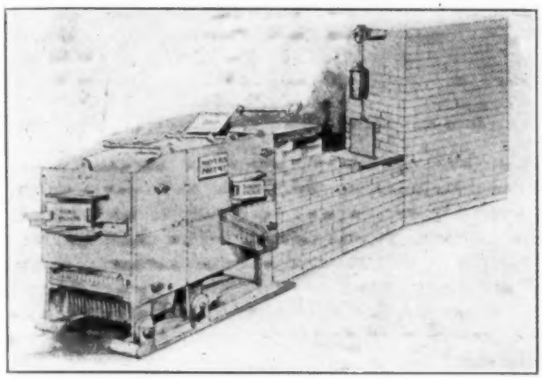


FIG. 4. PERSPECTIVE VIEW OF REVERBORATORY FURNACE.

A slide was exhibited showing the approximate quantities of fuel for the different types of furnace. (Table I.)

TABLE I.

APPROXIMATE COST OF FUEL FOR DIFFERENT TYPES OF FURNACES.

Type of Furnace	Size	Class of Fuel	Quantity of Fuel per cwt. of metal	Remarks
Reverberatory	¾ cwt. to 2 cwt. 2 tons to 20 tons.	Coal	84 lbs.	Smaller furnaces which can be worked continually have the coal consumption reduced about one-third.
Pit. Lift out crucible	300 lbs.	Hard coke	28 lbs.	Time of melting 45 to 60 minutes.
Pit. Lift out crucible	300 lbs.	Gas coke	36 to 42 lbs.	In small furnaces (60 lbs. and under) the difference is not so marked.
Coke tilting furnaces	400 lbs.	Hard coke	24 lbs.	Blast pressure 1½ in. to 2 ins. water gauge.
Oil tilting crucible furnaces	400 lbs.	Crude creosote or tar oil	1¼ gallons	Blast pressure from ⅓ lb. to 25 lbs. according to type of furnace and burner.
Oil tilting furnace without crucible	400 lbs.	Crude creosote or tar oil	2½ gallons	
High pressure gas crucible furnaces	60 lbs.	High pressure gas	250 cu. ft. per hour.	Pressure 12 lbs. per square inch. Cost of compressing gas should not exceed 2d per 1,000 cu. ft. Time of melting 60 lbs. = 50 minutes.

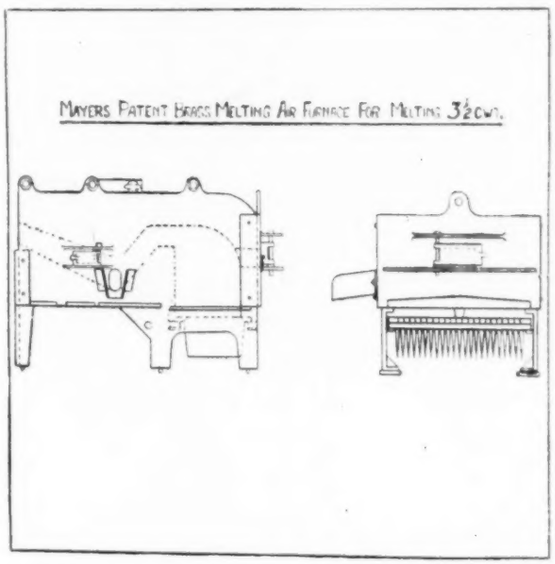


FIG. 5. MAYER'S PATENT BRASS MELTING AIR FURNACE.

With regard to the speed of melting, this in properly designed furnaces should be from 40 to 45 minutes for any size of pot up to one capable of containing 250 pounds.

The author proceeded to deal in detail with the subject of copper alloys, remarking that those engaged in the brass foundry were differently placed to workers in the iron foundry. The modern foundry chemist would say that it was a fallacy to describe the irons of 50 to 100 years ago as very much better than those of today, and he would further assure them that with the knowledge of the analyses and of the physical properties of the various brands of iron, it was possible, by skillful mixing, to produce an iron to meet any requirements so that, instead of buying expensive brands of iron, cheap brands could be mixed in such a way as to produce the same result.

Nothing like that could be said with regard to brasses and bronzes, which were in a very different position, because the basis metal must be copper. In brass foundries generally only one brand is used, which is known as "best selected"; there are no grades in copper as in pig iron, and the market price is the same the world over. The various alloys are made by the addition of tin, zinc, lead, etc., and no amount of juggling will make any difference. In other words, every alteration of mixture may be depended upon to produce some difference in the metal alloy. By way of illustrating these modifications of character through the varying of mixtures, the author called attention to five test bars all made from

the same alloy, and composing copper 85 per cent., tin 5 per cent., zinc 8 per cent., lead 2 per cent. The bars were made for the British Engineering Standards Committee, and were cast in the ordinary way from two separate pots. Then they were machined to British Standard dimensions, and afterwards analyzed to see if the metal was in its correct proportion, in regard to its constituents. It was almost unnecessary to say that those proportions were correct.

A table was exhibited (Table II) showing the grading of gun-metals. The first alloy, the author described as having .5 per cent. phosphorus, and being a good metal for steam fittings that have to be subjected to hard wear. No. 2 was the Admiralty gun-metal universally used in

TABLE II.

BRONZES.

No.	Cu.	Sn.	Zn.	Pb.	P.	Tensile Tons per sq. in.	Elongation Per cent. on 2 in.	Cost per ton. £ s d
1	88	10	2		.5	18 to 20	15 to 20	74 13 4
2	88	10	2			16 to 18	10 to 15	72 6 8
3	86	10	2	2		14 to 16		71 15 0
4	85	10	5			9.7	25	71 3 4
5	85	7.5	7.5			13.2	25	68 5 0
6	85	5	10			15.1	25	65 5 0
7	85	5	8	2		13	16	65 2 6
8	85	2.5	12.5			12.6	28	62 5 0
9	85	1	14			13.1	32	60 5 0
				BRASSES.				
10	60		40			25.	47	49 3 4
11	65		35			22.5	52.5	52 3 4
12	70		30			20	57.5	53 3 0

all best work, and eminently suitable for steam fittings and brasses repaired to stand heavy crushing loads. No. 3 was an alloy similar to No. 2, but with 2 per cent. of lead added, to assist machining. This was described as a first-class mixture well adapted to meet all general requirements. In numbers 4 to 9 the percentage of copper was the same. "Below 85 per cent. of copper the metal loses its gun-metal color, and has the appearance of brass. Unless gun-metal, brass and lavatory fittings have a good red color customers will often object to them; they prefer color to quality."

The author called attention to the remarkable economies possible by the selection of suitable metals. For example, if No. 6 alloy was suitable for a certain class of work, and an alloy of the composition of No. 2 was used, there was a waste of £7 1s. 8d. per ton. So that if 20 tons of castings were turned out per week, the value wasted would be £141 13s. 4d. In the case of No. 7, an alloy similar to No. 6, but with an addition of 2 per cent. of lead, the result of the addition was to bring down both the tensile and the elongation. No. 10 was described as the universal alloy for cast brass. In this case the addition of 2 or 3 per cent. of lead makes the alloy 60-38-2. This is a metal very suitable for fittings having to stand hydraulic pressure. The alloy No. 11 is described as very ductile metal suitable for castings requiring to be brazed. No. 12 is an alloy used in the rolling mills for brass tube and sheet, and is also suitable for castings requiring to be bent and brazed.

The author remarked that while he had demonstrated that copper tin zinc alloys could be made to compare favorably with copper tin alloys, as far as tensile and elongation was concerned, there would be a considerable difference in the hardness and wearing properties of No. 5 and No. 9, more especially in the case of a fitting similar to a steam cock that had to withstand heat and keep a good bearing surface. In that case No. 9 would be far superior.

TABLE III.

COPPER ALLOYS.

Hardness Numerals Obtained with 500 Kilograms = 9.83 cwt. Pressure.

10 Millimeter Ball Applied for 30 Seconds.

Alloy		Sand Cast	Chill Cast
Manganese Bronze		109	119
Phosphor Bronze	Cu80, Sn20	158	
Phosphor Bronze	Cu90, Sn10	86	
Gun-metal	Cu88, Sn10, Zn2	70	86
Phosphor Bronze	Cu80, Sn10, Pb10	50	80
Gun-metal	Cu85, Sn5, Pb4, Zn5.....	48-59	
Yellow Brass	Cu69, Sn1, Zn30	54-59	
White Brass	Sn66.5, Zn29, Cu4.5	19-20	
S. A. E. Babbitt	Sn84, sb9, Cu7		26-30

When making copper alloys for various classes of work, besides knowing the tensile and elongation of the different mixtures, it was necessary to know the hardness properties. It was clear from the chart (Table III) that there was a graduated scale of hardness, commencing with manganese bronze. They would notice that phosphor bronze having 20 per cent. tin was twice as hard as one containing 10 per cent. "Comparing phosphor bronze containing 10 per cent. with standard metal, which is practically the same mixture, the effect of phosphorus has been to put the numeral up from 70 to 86. Comparing the next phosphor bronze having 10 per cent. lead, with the next gun-metal containing only 5 per cent. tin, and having the lead reduced to 5 per cent., it will be seen that the hardness numeral is slightly higher in the gun-metal." In this chart the author called attention to the fact that the yellow brass, containing 69 per cent. copper, 1 per cent. tin, and 30 per cent. zinc, was harder than the last two alloys. They would notice that the effect of chilling increased the hardness. Although that effect had not been very great on the manganese bronze, yet in the case of the gun-metal it increased the hardness about one-third per cent. on the phosphor bronze containing over 50 per cent. Some interesting diagrams were exhibited, illustrating the color effect of various changes in the composition of copper zinc alloys, ranging between pure copper No. 10 and pure zinc No. 1. The plan was to add 10 per cent. zinc to each alloy, commencing at No. 9, which represented the color of gun-metal. No. 7 consisted of 70 copper, 30 zinc; No. 6 consisted of 60 copper and 40 zinc, while No. 5 comprized copper and zinc in equal proportions. The color of the last named, it was pointed out, was similar to No. 9 or gun-metal color. The chart, Mr. Reason remarked, had cleared up what had been to him a problem for a long time. Most of them were conversant with high speed turning brass used on capstan lathes, and had noticed its gun-metal color. Knowing its analysis, he could not understand why an alloy between No. 5 and No. 6 type should be as red as an alloy containing 90 per cent. copper. He considered that this explained the phenomenon, and he concluded that the extrusion process had affected the color. No. 4 was a metal too hard and brittle to work. It contained 60 per cent. zinc, and might be described as having reached the rotten stage. In No. 5, with 50 per cent. zinc, it was evident that at this stage the zinc produced the gun-metal coloring effect on the copper. That explained why the extruded rods, being an alloy between the 5 and 6 type, had a gun-metal color.

The question of the amount of lead in bronzes always creates a good deal of interest. It can be used up to three per cent. in most mixtures with advantage. The addition

of lead makes the metal easier for machining—an important factor in days of keen competition. A skillful furnace man can produce good gun-metal castings with an alloy containing five or seven per cent. lead. But great care has to be taken that the metal is not overheated, and the castings must be poured at the right temperature. If the castings are on the heavy side, and the metal is poured too hot, the lead will be forced to the outside in the cooling process. Friends of mine in the brass hollow-ware trade use high lead alloys. This is possible because, owing to the thinness of the castings, the metal sets very quickly, the lead is trapped, and does not get the chance to ooze out. The effect is almost the same as that of pouring metal into a chill. A good common brass for thin castings not required to withstand hydraulic pressure consists of copper 52 per cent.; zinc, 41.5 per cent.; lead, 6 per cent.; aluminum, .5 per cent. The following is the composition of a high lead alloy or nickel bronze:

Copper, 83 per cent.
Tin, 5 per cent.
Zinc, 5 per cent.
Lead, 5 per cent.
Nickel, 2 per cent.

This, I am told, proved a better alloy for hydraulic castings having to stand 3,000 pounds' pressure than the well-known composition 88-10-2. Although this alloy does not give a high tensile, it has the necessary closeness of grain to withstand the pressure. The difficulties of segregation in an alloy containing 5 per cent. lead are overcome by the introduction of 2 per cent. nickel. The high freezing point of the nickel traps the lead, prevents it from oozing out, and makes a close-grained alloy; it is the nickel that produces the good qualities for hydraulic work.

ANTIMONIAL BRONZES.

Owing to the high prices of tin, antimony, which is much cheaper, may be partially substituted, but it does not have the same hardening effect on copper as tin. The success of antimonial mixtures depends a good deal on the furnace man. The following mixture:

Copper, 83 per cent.
Zinc, 10.5 per cent.
Tin, 2.5 per cent.
Lead, 2.5 per cent.
Antimony, 1.5 per cent.

casts well and machines satisfactorily. Mr. Reason added that he would be pleased to hear the experiences of those who had used antimonial alloys. The last alloy may be called a standard alloy for railway axle-boxes, being the average of 15 mixtures used by the principal railways in Great Britain and America:

Cu., 85 per cent.
Sn., 10.0 per cent.
Zn., 2.0 per cent.
Pb., 3.0 per cent.

Tensile tons, 15.3 per cent.; elongation, 22.3.

"Fluxes are not used to a very large extent in brass foundries; it all depends on the class of metal used. For yellow brass, with large percentages of scrap, ordinary common washing soda is very beneficial.

"For bronzes, phosphorus is the best flux. In the case of castings that are difficult to make sound owing to shape or unequal thickness, you will find a small addition of phosphorus is a decided help. It gives a fine grain and non-porous casting. The phosphorus neutralizes and deodorizes the nascent oxides, which are nearly always present in molten metals, increases the chemical activity, and holds the mixture in a high state of fluidity, which enables the gases to escape. Otherwise these would form bubbles in the casting. The best way to add phosphorus is in the form of phosphor copper or phospor tin."

AN INVESTIGATION OF FUSIBLE TIN BOILER PLUGS*

By G. K. Burgess, Physicist, and P. D. Merica, Assistant Physicist.

The failure and deterioration of fusible tin boiler plugs in service has been investigated. In some cases such plugs have failed to melt and so give warning of dangerous boiler conditions, and investigation has shown that the tin filling in these cases had become oxidized to tin oxide (SnO_2), which has a melting point above 1,600° C. (2,900° F.).

About 1,050 plugs, of which 100 were plugs which had been in service, were obtained through the courtesy of the Steamboat Inspection Service, Department of Commerce, and subjected to examination. This included inspection of design and construction, condition and purity of the tin filling, and in the case of the used plugs their classification according to the type of deterioration undergone by them in service.

One pronounced and dangerous type of deterioration is the oxidation of the tin along the grain boundaries by which is formed a network of oxide throughout the tin. The plugs showing deterioration of this type all came from the same manufacturers, and contained zinc in amounts varying from 0.3 to 4.0 per cent. It is shown that this type of oxidation is due to the presence of this zinc. The latter metal is not soluble in the solid state of tin, and when a tin with small amounts of zinc is heated as in a boiler to about 180° C. (340° F.), this zinc coalesces at a network enveloping the tin crystals or grains. The boiler water, particularly if it contains alkali, will attack the zinc, eating its way into the alloy along the zinc network, and finally form the oxide network described.

Lead and zinc are found to be the principal impurities in tin plug fillings, and since all "failed" plugs contained these or other impurities, the conclusion is reached that if these impurities are eliminated by strict specifications and inspection, which will allow only admittedly superior qualities of tin, such as Banca and some others, the danger of failures of these plugs will no longer exist.

In order to test quickly the purity of a tin sample a determination of its freezing point may be made. This can be done conveniently with two or three grams of the sample, and requires only inexpensive apparatus, including a high resistance millivoltmeter and a copper-constantan thermocouple.

*From Bureau of Standards, Department of Commerce, Washington, D. C.

HIGH SPELTER PRICES.

Many Birmingham industries are badly handicapped by the great scarcity and high prices of spelter, says United States Consul Samuel M. Taylor, Birmingham, England, June 8. On July 31, 1914, the price was $105 (5¼ cents per pound) at port; now it is quoted at $525 (26¼ cents per pound). Sheet galvanizers are ceasing production. Black sheets are being put on the market and in a few cases corrugated sheets have been supplied painted. Very little galzanized goods of any sort are delivered in the way of general trade.

GERMAN SILVER

AN EXHAUSTIVE ARTICLE DEALING WITH THE MELTING, CASTING AND ROLLING OF THIS COPPER-NICKEL-ZINC ALLOY.—THIS MIXTURE IS NOW KNOWN IN ENGLAND AS NICKEL SILVER.

BY R. A. WOOD.*

(Concluded from June.)

In case the metal has not been properly cast or if it contains impurities to any great extent such as carbon, for instance, it will be more or less brittle and is apt to break up when given a pass through the rolls. Sometimes it will split down through the center of the bar and at other times the crack will start at the edge of the bar and run diagonally toward its center; metal which breaks up in this manner will be found to have a grain of a coarse and sandy nature. If the German silver has been made of a good grade of metals and properly cast, rolled and annealed, no fear may be had of its breaking up during the rolling or of fire-cracking during the annealing operations. Water should never be used to assist in cooling off the German silver after it has been annealed as it will cause it to crack (water cracks), these cracks generally start at the edge of the bars and run toward the center, sometimes going straight across and at others in a diagonal direction.

German silver is rolled in much the same manner as brass and a rolling mill having rolls 20 inches diameter, 30 inches face, 16½-inch necks and running from 11 to 18 revolutions per minute will roll 18 per cent. German silver as follows:

Metal 5 inches wide.

From 1⅛ in. thick to ¾ in. thick, 3 passes; then anneal
" ¾ " 7/16 " 3 " " "
" 7/16 " ¼ " 3 " " "

Metal 6½ inches wide.

From 1⅛ in. thick to ¾ in. thick, 4 passes; then anneal
" ¾ " 7/16 " 3 " " "
" 7/16 " ¼ " 4 " " "

Metal 8 inches wide.

From 1⅛ in. thick to ¾ in. thick, 4 passes; then anneal
" ¾ " 7/16 " 5 " " "
" 7/16 " ¼ " 4 " " "

Metal 10 inches wide.

From 1⅛ in. thick to ¾ in. thick, 6 passes; then anneal
" ¾ " ½ " 5 " " "
" ½ " 5/16 " 3 " " "
" 5/16 " ¼ " 2 " " "

In working the metal as above described it is first broken down to ¾ inch thick and annealed, after which it is taken to the overhauling machines to have its surfaces scraped off and inspected for any flaws contained therein. Should any such flaws be found they are chipped out by means of a chisel, after which the bars of metal are brought back to the breaking down rolls for the next rolling operation. Some of the mills do not overhaul their metal until it has been rolled down to about 7/16 inch thick, this makes a larger surface to scrape away with a corresponding increase in the amount of scrap produced.

In rolling from ¼ inch thick down to the thinner gauges the metal is reduced from four to six gauges between annealings, the amount of the reduction on each pass through the rolls depending on the strength of the mill. After the metal has been rolled down so thin that the top and bottom rolls touch one another it is best to shut the rolls down tight together and give the metal one pass through, after which it is annealed and the operation repeated until the desired thickness has been reached. As a rule, the thinner gauges of German silver are rolled about the same as common brass.

The speed and size of the rolling mills used for rolling German silver are the same as those employed by the larger mills for rolling brass. The following data is taken from two of the larger mills in the Naugatuck Valley in Connecticut.

	Diameter	Face	Necks		Revolutions per minute
Breaking down rolls:					
Mill No. 1..	20 ins.	30 ins.	16½ ins.		14
Mill No. 2..	20 "	30 "	16½ "		13
Running down rolls:					
Mill No. 1..	18 "	36 "	14 "	wide metal	20
Mill No. 1..	18 "	36 "	14 "	narrow metal	25
Mill No. 2..	20 "	36 "	16½ "	wide metal	22
Mill No. 2..	20 "	30 "	16½ "	narrow metal	22
Finishing rolls:					
Mill No. 1..	18 "	36 "	14 "	wide metal	20
Mill No. 1..	18 "	36 "	14 "	narrow metal	25
Mill No. 1..	16 "	30 "	12 "	narrow metal	45
Mill No. 2..	16 "	30 "	12½ "	wide metal	36
Mill No. 2..	16 "	30 "	12 "	narrow metal	60

There are some of the smaller mills which, owing to their lack of suitable power, do not run their running down and finishing rolls at as high a speed as the above mills, but the breaking down rolls all run at about the same number of revolutions per minute. Still at the same time, I know of one mill which makes a specialty of rolling German silver whose breaking down rolls are 18 inches diameter, 30 inches face, with 14-inch necks, and they make 22 revolutions per minute. It is not always advisable to try to run the rolls at too high a speed, as there is nothing to be gained by running the rolls any faster than the metal can be fed into them. Also high speed will cause trouble from the necks heating and the lost time caused by this difficulty will offset any gain which may be obtained by speeding the rolls up.

Wide German silver sheets are rolled in much the same manner as is sign brass. It is not necessary to pickle the sheets after each annealing, but care should be taken to see that the sheets are washed free of all loose dirt and scale before being passed through the rolls. The sheets should be pickled and cleaned for the finishing rolling, as well as for the previous rolling when they are made ready for finishing.

CLEANING AND PICKLING.

The cleaning of German silver is not always an easy proposition and different mills have different ways of cleaning up the surface of the metal. Some mills use the regular brass pickle composed of from eight to ten parts of water to one part of oil of vitriol, they do not pickle the brass and German silver in the same tub, but use the tub for German silver exclusively. If this pickle is heated by means of running steam pipes through the solution better results will be obtained, but live steam should never be blown into the pickling tub as it weakens the solution. Other mills use a

*Rolling Mill Superintendent.

nitric acid dip for cleaning their German silver; when this is the case the metal is first cleaned in the regular oil of vitriol pickling solution and afterward dipped in the nitric acid bath. This method cleans the metal nicely, but is very objectionable on account of the fumes from the nitric acid. A few of the manufacturers of German silver clean the metal in the following manner: it is first pickled in the regular oil of vitriol pickle, after which the metal is placed in a tank holding a solution composed of water, bi-chromate of potash and oil of vitriol. It is made by adding four quarts of bi-chromate of potash (crystals) to twenty gallons of water and then gradually adding, stirring at the same time, oil of vitriol until the bi-chromate crystals have all been dissolved; if too much oil of vitriol is added it will turn the surface of the metal black; also, if the metal is left in the solution too long it will have a dirty color. The metal should be put into this solution and left just long enough to clean up and then be taken out; by careful manipulation this makes the best medium for cleaning German silver that I know of. The solution is not very durable and, as it cannot be renewed with any amount of success, it has to be frequently changed and made up fresh each time. It should be used in a lead or porcelain tank as it attacks wood quite rapidly. A little experimenting with this solution will prove its worth and uniform results may be obtained. Its action seems to be to remove the copper from the surface of the metal, leaving the zinc and nickel behind; this causes the metal to have a whiter color than would otherwise be the case and the lower grade of alloys have thus the appearance of containing a higher percentage of nickel than they really do.

(THE END.)

A SIMPLE AND SUCCESSFUL DIP GILDING SOLUTION

By CHARLES H. PROCTOR.*

Dip gilding is used very extensively in many metal plating departments to produce thin bright deposits of gold upon such articles as safety pins, buttons, metal novelties and even art metal goods made from base metals, such as zinc and antimonial lead. After the articles are copper and brass plated and the finishing is accomplished as far as the polishing or burnishing, they are finally gilded in such solutions because they produce very thin and uniform coatings, at very low cost for gold, that are afterwards lacquered.

Many forms of dip golds are in use, but they mostly contain yellow prussiate of potash and the iron contained therein causes a precipitation of some gold which is frequently lost unless unusual care is used to save the precipitate and recover the gold afterwards. The dip gold solution I am about to describe is one I have developed primarily for simplicity and rapidity of action. It is in use in one of the largest safety pin factories in the United States, and also for gilding keys in one of the largest hardware factories. It has proved to be more simple of operation, more uniform in color and more economical than any other solution previously used for the purpose.

The solution may be prepared in a regular enameled iron receptacle. I would suggest that white enamel be given the preference and provisions should be made to heat the solution to 180 to 200 degrees Fahrenheit. The proportions based upon one gallon of solution are as follows and should be mixed in the order given:

Hot water, 180 degrees	1 gallon
Soda ash, 96%	6 ounces
Gold trisalyt	¼ ounce
Sodium cyanide	4 ounces

Brass articles must be previously acid dipped in the regular way to produce a clear uniform lustre as bright as possible. Polished articles must be cleansed in the usual manner as for plating, and this also applies to articles made from zinc or antimonial lead that are copper and brass plated and afterwards polished or burnished to produce a lustre finish. In every instance the article to be gilded should be passed through a dilute cyanide dip and re-washed in clean water previous to gilding.

When quantities of small articles are to be gilded at one time they may be immersed in the solution in an uncoated iron wire basket as iron wire does not become coated with gold. Other larger articles are strung upon soft iron or copper wire. The time of immersion of the articles should not be more than five or ten seconds and after gilding they should be drained well and washed in a separate receptacle containing clean water. This first wash water will contain small amounts of gold and may be used for replenishing the water in the gold dip lost by evaporation or by removal from the solution upon the articles. The articles should be washed again and dried out in the regular manner and, if necessary, lacquered.

When very light tones of gold are desired it is advisable to use a very weak preliminary silver dip. This dip prevents the reduction of some brass from the articles of reciprocal decomposition. The silver when so reduced helps to maintain a yellow color in the gold dip, while on the other, as brass contains copper and zinc the copper will eventually darken the gold a little. The silver dip should consist of the following:

Water	1 gallon
Silver trisalyt	¼ ounce
Sodium cyanide, 129%	¼ ounce

Use this dip cold and immerse the articles in it for a second or so or until an almost imperceptible film of silver is deposited, then wash in cold water and immerse in the gold dip.

As the gold dip becomes exhausted, a little more cyanide of sodium may be added, but never more than ⅛ of an ounce per gallon at one time and then gold trisalyt and also silver for the silver dip. I have mentioned gold and silver trisalyt in the preparation of these dips as I have found them to give the best results as they consist of proportions of sodium cyanide, gold or silver cyanide and a pure sodium sulphite in chemical combination. Gold and silver chlorides may be used, but the advantages are, as I have found, more satisfactory and more economical when the trisalyt combinations are used for the purpose.

*Plating Editor of THE METAL INDUSTRY.

FLUOR SPAR.

About 80 per cent. of the domestic and all of the imported was consumed as a flux in basic open-hearth steel furnaces. The small remainder was used as a flux by silver, copper and lead smelters; in the manufacture of fluorides of iron and manganese for steel fluxing; in the manufacture of glass and enameled ware, etc.

THE INFLUENCE OF STYLE ON THE ART METAL WORK OF MODERN TIMES

A Series of Articles on This Interesting Subject.

By A. F. Saunders.*

(Continued from January.)

THE MODERN RENAISSANCE.

The old renaissance was a revival of classical form and idea; it spread to every country in Europe where art was loved and practiced. We of today are in the midst of another renaissance, but this modern re-birth is not a revival of anything in the past, but is an awakening of the whole world in art to the ever-recurrent need for real beauty, to the desire to supply something new, something lovely, lovelier if possible than all the efforts of the past.

Like the older renaissance, the new has drawn its theme from its own time, its inspiration from the past, but free from the convention—the impeding rules of the past. Let those who will, sneer at this modern renaissance, new art, or by whatsoever name it may be designated, the fact remains that this art movement has rekindled art enthusiasm in every civilized country on the globe. It has created a fresh interest in things beautiful, and the greatest good of all has been accomplished by bringing the artist and craftsman into closer active co-operation; it animates them in their efforts, bringing out the best that is in them, and designates a free soil upon which anyone can cut a pathway for himself.

A mistaken idea is often had in assuming that the manifestations of the various small groups of artistic producers like the Nancy people in France, the Glasgow school in England, the Munich men in Germany, or the several art communities in our own country, stand for the whole awakening; each is but a phase of some new activity out of which something will develop that will worthily represent twentieth century thought and action.

In the formation of a new style it is most difficult to determine just where or how it shall begin. It is one thing to discard the old ideals and quite another to define the full scope of the new, with nothing to take from, no traditions to base the evolution of a new style upon. It is but natural that the first efforts should result in a succession of crudities calculated to invite the ridicule of the unsympathetic; such are the difficulties that have beset the efforts of the new school from the start, yet the movement has flourished. In fact it is firmly established, the promise of originality is always alluring to the artistic temperament, and after a decade of groping a general principle of proceedure has now been fairly well defined.

Throughout the course of history no epoch-making idea of idealistic tendencies has ever arisen, which has not been quickly counterfeited by an army of profit seekers, but never perhaps has this phenomenon been so strikingly instanced as in the way this new art movement was seized upon and exploited. For a time the markets were flooded with a mass of meaningless stuff under the names of L'Art, Nouveau, L'Art Moderne, Arts and Crafts and Handicraft work, that can truly be said not to have possessed a single commendable feature, the very principles of design being completely ignored, but in time the fad as it really had become wore out, the wheat became separated from the chaff, and the movement began a healthy growth once more.

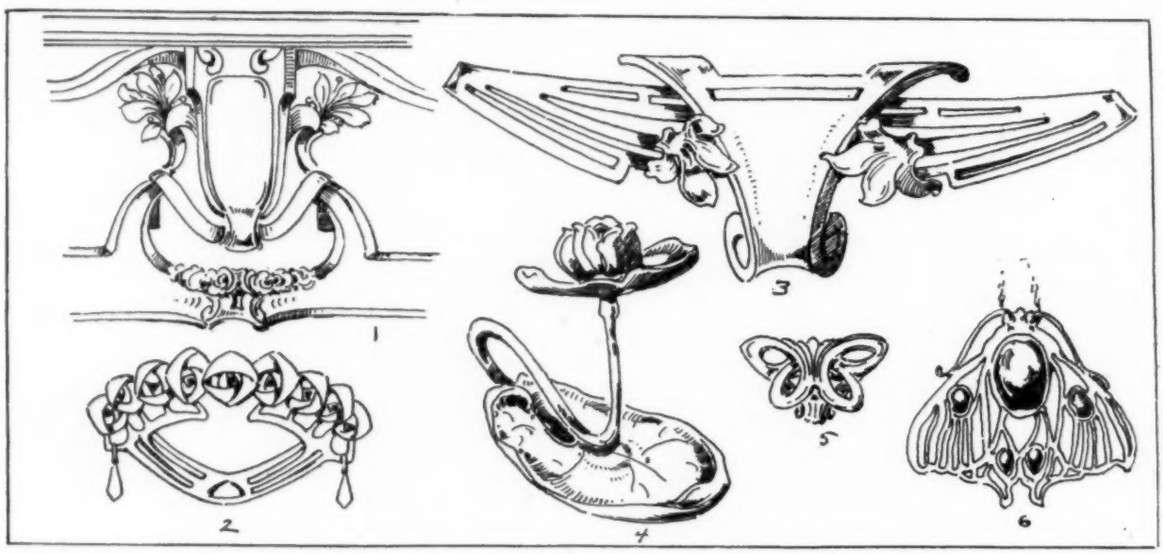


PLATE 1. THE MODERN RENAISSANCE.

No. 1, Decorative Unit, Modern French; No. 2, Rose Motif, Used as a Brooch, Modern English; No. 3, Decorative Unit, Modern German; No. 4, Water Lily Candlestick, French; No. 5, Silver Brooch, Showing Use of Flowing Lines, French; No. 6, Gold Wire Filigree Pendant, Showing Use of Insect Life as Decorative Motif.

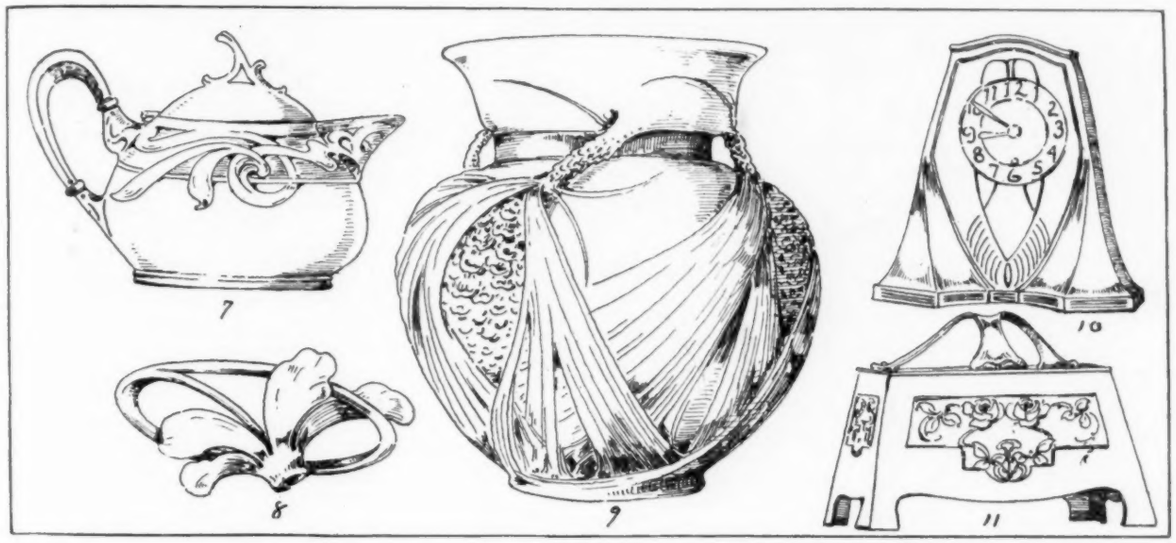
The initial movement for a new art or renaissance really began in England under the influence of the pre-Raphaelites and the ideas of John Ruskin; it was carried into practical affairs by that genius William Morris. That there has developed two phases or systems can be plainly discerned, one of purely ornamental lines, the other of floral elements, each phase having fervent champions and active detractors.

To begin with, the fundamental principles of the modern renaissance are based on, first, the expression of individuality; second, to subject each object to a strict system of logic relative to the use for which it is destined and to the material from which it is formed; to show clearly the part played by every detail of the form and its decoration, to avoid falsifying every material and in

*Designer, Benedict Manufacturing Company, East Syracuse, N. Y.

carrying ornament to extremes. Thirdly, it expresses in design the constructional requirements of the object to be executed; thus in metal work the nature of the material is of first consideration, in proportion to their malleability and ductility the different metals dictate their own artistic development.

It is most gratifying to those interested in the advancement of art metal work in our own country to observe the vast improvement made in the last decade in both the designing and making of all classes of art metal ware; beauty must be sought in all art productions, and as much so in our metal objects as in our buildings, our furniture,



PLATE, 2. THE MODERN RENAISSANCE.

No. 7, Tea Pot in Silver, French, L'Art Nouveau; No. 8, A Simple Cyclamen Blossom, Used as a Motif for Gold Brooch, French; No. 9, Jardinere of Beaten Silver and Copper, Modern French, Craft Work; No. 10, Modern German Clock in "Jung Stil"; No. 11, Handicraft Jewel Casket, Modern English Work.

The constructional necessities are accentuated and serve as a starting point for the decorative scheme.

The decorative motifs developed as used in the modern styles show certain unconscious race preferences, just as we recognize each of the old period styles by certain definite motifs, so can we trace or classify the various phases of the modern renaissance by the distinctive motifs and their treatment as worked out by the art producers of the various countries.

and all things that make the home beautiful. Beauty of form first, beauty of decoration second, and beauty of service third. An object to be well designed must worthily fulfill the purpose for which it is intended, whether that purpose is purely ornamental or for serviceable use.

The several illustrations shown with this article will serve to show some of the characteristic features of the various phases of the modern renaissance.

A MODERN PIECE WORK SYSTEM FOR A LARGE PLATING DEPARTMENT

By Charles H. Fleischer.*

In large plating departments where a great many small orders are handled daily, the piece work question has been a difficult problem for many foremen to solve. Some have decided that a plating department cannot be run on a piece work basis.

If the solutions are properly cared for, the daily production is more uniform from a plating tank than it is from a press, because there is no delay in setting up; consequently one order can follow immediately after the other. One of the greatest mistakes made in a plating department is that when new lines of goods are added they are sent to finish, without figuring out where it is best to finish them. Everyone thinks you can always hang in a few more pieces. If proper records are kept, the foreman can tell at the close of each day whether the product delivered to him is greater than the capacity of any one tank. He will not be helplessly behind before taking the matter up with the main office.

To get a full production from each tank it must be done piece work. Some foremen have asserted that they could obtain as large and as uniform a production by day work. The author is absolutely certain that if the piece work system is given a fair trial there will be no doubt as to a greater product. If this is done, no foreman will want to return to the old day-work method. Of course we all know if a foreman is convinced that he does not want piece work in his department there is no use in trying it. He should be free from set opinions.

One objection to piece work is the time lost in changing tickets on small orders. This can be overcome. In all plating departments there are standard operations, namely:

Operation No. 1—Stringing.
2—Pickling.
3—Cleaning.
4—Hanging in solution.
5—Taking out solution.
6—Rinsing and drying.
7—Unstringing and packing in barrels for next department.
8—Man in charge of gang and solutions.

By combining the operators on one ticket we have a gang.

Fig. 1 shows a section of a plating room where nickel finish is done. We will call this gang "A."

*Foreman Plater, Stanley Works, New Britain, Conn.

If each of these nine operators were to change individual tickets after completing each small order, piece work would certainly be a failure. This method of piece work interferes too much with the production, makes too many tickets to handle and figure, and certainly more chance for mistakes.

In the system described below there are four important points taken into careful consideration, namely:

No. 1—Does not interfere with product.
2—Less chance for mistake.
3—Less tickets.
4—More accurate cost.

To make my point clear: Say we have received a new line of goods—stove legs (classed as No. 796)—to be nickel finish. First we make a careful time study of each operation, so our piece work price can stand as

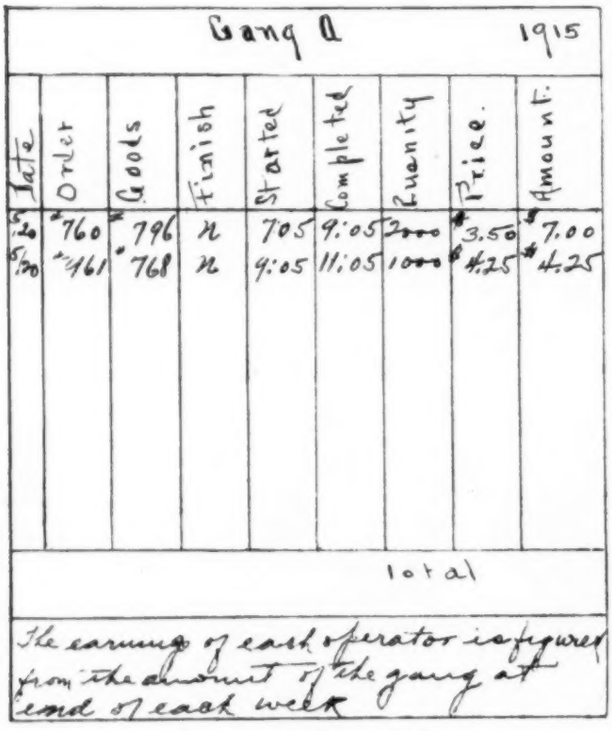


FIG. 1. A "GANG" TICKET.

long as the method of plating and quality of work remain the same. On gang "A" No. 796 nickel.

Operation No. 1—50c.	per	1,000	pcs.
2—35c.	"	"	"
3—40c.	"	"	"
4—45c.	"	"	"
5—40c.	"	"	"
6—45c.	"	"	"
7—30c.	"	"	"
8—65c.	"	"	"
Cost price $3.50	"	"	"

(You do not have the proper co-operation with the help by continually cutting prices, or by making the prices too low. The operators are apt to figure on what they call a fair pay and just work to get that amount each day, if they think you are going to cut the price when they get all there is in it. I think it a good idea to be certain of your price, then tell your help to go ahead and work for all they can make. It is encouraging to them, and you get the full efficiency of your tanks.)

After making your prices as shown above and getting your gang price, including man in charge. This price is the only price shown in your price book. For each gang carry the percentages listed according to operations for quick reference. These percentages always remain the same, regardless of change in price or in making out new prices on that gang, unless, of course, the method of plating is changed, by either adding or omitting an operation.

If you wish to know the total cost of a certain line of goods, all you have to do is to look up the price; or if you only want a certain operation cost, all you have to do is figure it out from the set of percentages above mentioned.

The gang tickets are a convenient size to file, having about fifteen to twenty spaces for items. See ticket below Fig. 2.

To find the cost of operation No. 2 on No. 796 goods, multiply the price $3.50 by the percentage .10, equals 35 cents, cost of pickling operation No. 8—$3.50 by the percentage .185, equals 65 cents, cost of man in charge, etc.

The percentages only have to be figured once a week.

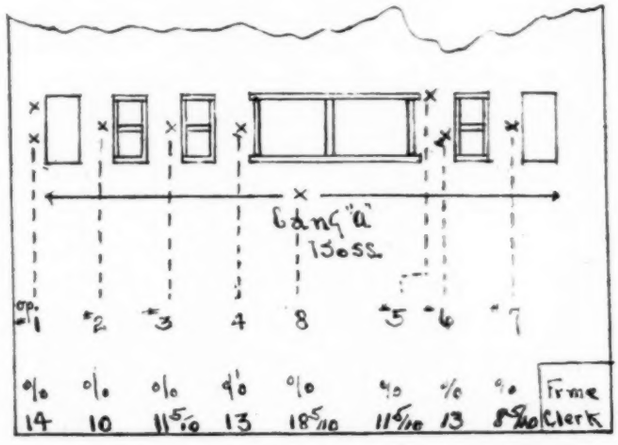


FIG. 2. SHOWING A SECTION OF A PLATING DEPARTMENT.

You only have six tickets for each gang, with one or more items on each ticket. For gang "A" the old method of individual piece work tickets you would have fifty-four tickets; that is, if you only had one item a day on that finish, so if you had a dozen or more items you can readily see that the quantity of tickets are greatly reduced by the gang system.

These gang tickets are brought to the time clerk by the man in charge of the gang, to have work written on, or to change at close of day for a new blank. He is the only one who should have time to leave the gang. He also takes the place of any operator wishing to leave for a few minutes.

When the production is less than the capacity of the tank, the operators may handle one or more operations without changing the prices or percentages. This is done by giving the operator as many percentages as the operations he can handle. In this way the cost of goods remains the same.

I firmly believe you can get better results with this method of piece work, also better co-operation of the help. And as I above stated, you have your cost in a nutshell.

Fig. 2 shows section of plating department. (X) shows position of each operator; also shows number of operators on one gang ticket and the percentage of the total price each operator is entitled to.

EFFICIENCY IN THE BRASS FOUNDRY

AN EXPERT'S METHOD OF MATERIALLY CUTTING DOWN COSTS WHILE INCREASING PRODUCTION.

BY W. R. DEAN.*

In the last few years the brass foundries have been waking up to the fact that efficiency in the foundry is not some high-flown idea, hard to put into practice and harder to carry out, but a paying investment, easily established and carried out or followed. There are still hundreds of foundries that do not know what the word means, or if they do, a walk through their shops does not show it. Webster's definition of efficiency is, effectual power, which further means completely operative power. Now that means producing results without waste of time, labor or material, completely operative. Efficiency has been confined mostly to specialty shops, such as the automobile foundries. Makers of plumbers' supplies and the like, where competition is keen and they have been driven to better methods to cut costs. A few leading jobbing foundries practice it, but most shops, especially small ones, or those connected with large plants where there is no keen competition, have kept it locked out.

The first essential of efficiency is harmony throughout the plant. Harmony from the president down to the office boy or laborer. The organization should be built up so that all hands work together. If there is a bit of friction, the efficiency of the plant fails to perform its best functions. To get best results or perfect efficiency, the managers or owners should show some interest in the men besides the mere interest to get as much out of them for as little as possible. The men are human, not mere animals or beasts, and will do their best, show more interest and help to establish and maintain efficiency methods if the owners or managers treat them as human beings. A good many concerns do not treat their men as well as they would horses or dogs, they hire and fire them as they would buy or condemn material. The value of efficiency is twofold; it keeps the men better contented and gives more profits to the stockholders. Of course the men do not perform their best or increase their output without some monetary compensation as an incentive. The average man is not going to put more profits into the coffers of the stockholders without some consideration himself. When plants try to increase their profits by making the men do more work without giving them more for it, strikes usually result.

Efficiency is not any wonderful thing hard to master and hard to carry out, it is simply the elimination of waste, waste of time, labor and material. As I have said before the first essential to keep the efficiency methods up to their best, is harmony. Everyone interested in the plant and its success and all pulling together. The first thing to put an old foundry on an efficient basis is to start to clean it up and keep it clean. A good many foundries have an inadequate number of laborers, thinking by so doing they are keeping down expenses, assuming that non-productive labor is non-paying, and only increases the over-head expense, and as a sequence the shop gets neglected and flasks and dirt pile up and a moulder wastes time looking for things to work with, or else hangs around until a laborer finds it, and nine times out of ten it is the last thing found or is on the bottom of the pile. The next thing to take into consideration is the arrangement or re-arrangement of the shop. Old foundries are usually poorly arranged for the convenience of handling material or saving steps. The shop should be so arranged that raw material enters with the least amount of labor and leaves a finished product without retracing its steps or having caused an extra amount of steps.

Materials and supplies being the first things used in starting to get out a finished article, should have first consideration in arrangement. There should be a store and stockroom under a capable man and arranged systematically and conveniently. The store and stock room should be handy to the street or cars for quick unloading and storing away. There should be a trolley arrangement for handling bulky material and storing high to save floor space. This can be run by compressed air or electricity, or in a small shop, by hand hoist. This will cut down labor expense and handling by man power. If the stockroom man has to call on an extra man for a lift, they do not consume the time for the lift only, but stop to tell a story and waste unnecessary time.

Besides the store and stockroom for metals and supplies, such as rammers, riddles, shovels, brushes, etc., there should be provided facilities for quickly unloading sand, coke and coal, repairs for furnaces, etc. The bins for these should be handy and of easy access to the foundry. Tramways and tramcars should be provided for handling or transporting large loads to the foundry or sand to the moulders. The bins for the sand should be well protected from rain and snow and spare heat should be sent there to keep the sand from freezing in the winter. This would facilitate matters quite materially in handling same.

In the stockroom large bins should be provided for the reception of gates and sprues that are not in daily use, and over each bin should be marked the name or number of each alloy. A weigh card can be used to keep the account of the amount in each bin, the original amount is put down and all other weights are added or subtracted as the case may be: For example:

No. 1 ALLOY BIN ACCOUNT

Amount In	Amount Out	Bal.	Amount In	Amount Out	Bal.

Four hundred pounds represents the amount in the bin to start with, we have a small heat and use 200 pounds. We have 200 pounds left in the bin, the gates, etc., come back and weigh 80 pounds. We add to balance and have 280 pounds in, then we draw a line through our other accounts and start with 280 pounds, and so on. This gives the amount in each bin at any time at a glance and at weekly or monthly stock-taking it is not necessary to weigh the gates and sprues. If there are several different kinds of metal and some is used rarely, this will be very convenient and a labor saver, and the metals are not all mixed up.

After planning the size of a new foundry for present and future needs, the furnaces should be placed in the most convenient place that is handiest to all moulding floors. If a great deal of manganese bronze or yellow

*Brass Foundry Foreman, Hyde Windlass Company, Bath, Me.

brass is poured, a melting room apart from the main foundry should be built and should be well ventilated and a good big, open doorway provided to allow the quick transportation of the metal to the moulders. A suction blower could be provided to remove the zinc oxide fumes as soon as possible. For if anything is more detrimental in a brass foundry to the contentment of the men than zinc oxide fumes, I have yet to hear of it. When they begin to get the spelter shakes, they get discontented. In the melting room, or at the melting floor, everything for the easy handling of metal, crucibles, and the like, should be provided, and a place arranged for tongs, pokers, stirring rods, etc., so that they will not always be lying around in everyone's way. In locating this melting floor or room, the handiness to the stock room has also to be taken into consideration, also the handiness to the fuel bins. Tramways, or an overhead monorail system should be provided for handling large quantities at once.

The cleaning room, besides being handy to machine shop or shipping room, should be handy to the stock-room, so as to return gates and sprues easily, as these should be sent there for weighing back before taking them to the furnaces. All stock should be weighed before being sent to furnaces and records kept of waste, etc., so as to check the melters and find out the actual cost of a pound of alloy.

Now comes the layout of the core department. This should be placed near the melting room and the waste heat utilized as much as possible for drying the cores. Cranes should be provided for handling large cores and the core department should be handy to the main foundry crane so as to get the large cores and set them in the moulds. Easily operated cars should be provided for placing the cores in the ovens for drying, and all up-to-date appliances added to facilitate rapid core-making and a core machine for stock cores.

We now come to the layout of benches and space for floor molding. Perhaps the floor molders should be considered first. They should be convenient to the flask yard, so as not to require too much handling of flasks. All large flasks should be housed or yarded outside the main foundry, as they are not used as much as bench flasks, and take up too much valuable room. A cheap lean-to can be built to cover the more commonly used flasks, as that will keep off the rain and snow and make them easier to get at in winter and add to their life. The quicker an article can be handled and with the least amount of labor, the less expense. Overhead is kept down the best by quick and economical handling of appliances.

The arrangement of the floor molders depends largely on the class of work carried on and can be best arranged by someone on the job, rather than on paper.

The bench molders, as far as possible, should be arranged according to alloys they are working if more than one alloy is used. Do not have them arranged as I have seen them in some jobbing foundries. In one shop 7 or 8 alloys were used daily, besides a few occasionally. The men were put in according to empty benches, not according to alloys. A pouring gang was used, and the foundry long and narrow. They would pour a few flasks at one end of the shop and have some metal left and have to go the whole length of the shop to connect with a molder using the same alloy. In hurry-up jobs this is sometimes unavoidable, as the only molder available that can do the job quick and neatly has been on some other kind of metal and is some distance from this specific alloy. With a little planning though, this can almost always be done away with. It is necessary to go over the men and see who is best on certain alloys and keep them to that alloy as much as possible. That is, keep all men good on manganese bronze on that alloy as much as you can, those good on yellow brass, together etc., those good on red brasses, together, etc. Then, in allotting the work, keep the thin castings together and the thick ones together. This will hasten the pouring, as the pourers do not have to jump around so much. Or, in other words, systematize the work and men so as to save steps, labor and time in handling. Do not do things as our forefathers were wont to do, any old way, but get abreast of the times. System and efficiency in the layout and handling means despatch in getting the work out and does not cause so many unnecessary delays in filling orders and keeps customers satisfied.

Another important thing to carry out is, stick to one order as much as possible until it is filled, do not start one order and only do a little and put it one side to start something else and so on, and have nothing finished. Continual shifting delays them all, and puts you further behind than if you make each order take its turn. The filling of orders should be laid out by the production engineer, a most necessary man in any large manufacturing plant. In small plants this office can be combined with some other office, or come under the drafting department. The production engineer is a great help in keeping up the efficiency of a plant.

After the layout of the foundry is placed and carried out, we come to the molders themselves. The operations of the molders must be looked over and all means to save steps and time and increase their production taken into consideration. This is best and most economically accomplished by having an efficiency engineer come and do it. This efficiency arrangement is hard to write about, for different shops have different needs. The general idea is to take the man that does the best and quickest work and put the stop watch on him and time his different movements while eliminating the unnecessary ones, get his co-operation and have things provided to keep his floor in order, etc. Usually in all foundries there is one man, especially if he is doing piece-work, that has a place for everything and everything in its place. He does not keep things lying around everywhere and has everything handy and within easy reach, and does things systematically, so as to save steps and time and produce as much as possible. This man is what you might call 90 per cent. efficient. There are usually a few things that can be eliminated to make him 100 per cent. efficient. This man is taken as an example and others are taught to pattern after him, so as to increase their output and save steps and time. After a man is shown that he can do the same amount of work without being so tired at night, he is usually ready to do it. But to get him to do more, requires a bonus or piece-work system. The average man is not going to put out more work without extra compensation. He reasons that he is only putting more money in the owner's pocket without getting anything himself, but if the manager is ready to give a bonus for increased work, the man is ready and willing to co-operate and he helps keep up the efficiency of the plant at less cost. The average man is not going to do in 5 or 6 hours what has been a 9-hour job for years, unless he sees something coming his way, and the management can well afford to pay a bonus. As an example, suppose a man gets 34 cents per hour and makes a job in 9 hours: the job costs $3.06. If he can be induced by efficiency to do it in 6 hours, it costs only $2.04, and saves $1.02 on the job, not taking into consideration the diminished overhead expense to charge to the job. Now, if there has been a profit on the piece before, and we assume there has, this $1.02 is added to it. Now the company can well afford to give the molder a share, it not only makes more profit, but can deliver the goods quicker and get started on another

job, so, besides the direct profit on that one piece there is the increased output, which shows up at the end of the company year.

The indirect or non-productive labor question is one of the main questions in a foundry. It requires good judgment to know just how many to employ so as not to have too high a percentage of non-productive against productive, and also to get the most work out of the men and see that no one soldiers on the job. All mechanical appliances that tend to cut down indirect labor should be added if of sufficient merit to warrant it, and each laborer given a specific amount of work to do each day.

Different foundries do differently, some do not have the molders cut the sand, pour the work, or dump the flasks, hiring laborers to do it. Others let the molders do all that and only keep laborers to do the cleaning up and get the flasks and patterns.

Personally, I prefer, in large shops, to let the lumpers do the dumping up and shaking out the castings, cutting over the sand and pouring the work. This class of work comes under unskilled labor, and can be done cheaper by laborers than by molders. One laborer to a certain number of molders, depending on the class of work. It pays to pick out the most intelligent and pay a little more a day to them to retain them, than to pay the going wages and have to be always breaking in a new man. This class of laborer needs some instruction in tempering sand and pouring the work. In small foundries, this arrangement would not pay. It would be better to let the molder shake out his own work, etc. It is false economy in a large plant when times are hard and work slack, to try to cut expenses by cutting down the indirect labor proportionately greater than the skilled labor to the detriment of the efficiency of the place. Keep the foundry clean and picked up at all times. You may be able to cut your insurance rate by so doing. It will cost more to clean up when business does pick up.

The greatest detriment to efficiency is a management that runs a plant as if they knew it all and no one else around the place knew anything. The foremen should be consulted more than they are. Men of lesser jobs sometimes are better informed about some specific thing than the management. The greatest loss is sometimes in the purchasing department. The purchasing agent should consult the men using the purchases more than they do to find out the quality, etc. For instance, supposing you buy a grade of coke that is entirely satisfactory to the melter. He can do his best with it and is contented. Would it not be well to find out about it and get the same kind every time? Instead, some agents are led astray by some seller to buy some other brand that is cracked away up and guaranteed to be better, but proves far inferior, but they, the purchasing agents, never take the trouble to find out; they have perhaps bought it for a little less per ton, and let it go at that, thinking they are saving, when in reality is costs more in the end, being so far inferior.

In summing up, the main things to raise the efficiency of a plant is harmony between management and employees, co-operation, system, cutting out waste, perfect organization, discarding old and antiquated methods and machines, getting up to date and putting in mechanical appliances wherever practicable and keeping in touch with newest developments in the art.

THE DETERMINATION OF SPELTER COATING ON SHEETS AND WIRE*

Analytical Methods for Ascertaining the Weight of Zinc Deposit in Ounces Per Square Foot.

By J. A. Aupperle.

For many years the Preece copper-sulfate test has been used to determine the amount of galvanized coating on sheets and wire. Committee A-5 on the corrosion of iron and steel reported to the society in 1911 on this test as follows:

"It is, however, the unanimous opinion of the committee that the well-known Preece copper-sulfate test is unreliable, and shall be abandoned entirely as a basis of specification with respect to galvanized sheet and plate. In respect to wire, the Preece test has the advantage of being quick and simple, and if carried out in the proper manner yields comparative results of value. In the opinion of the committee, the lead-acetate test is preferable to the copper-sulfate test for determining or specifying the weight of zinc coatings."

The lead-acetate method recommended by Committee A-5 in 1911 yields very accurate and satisfactory results, but the length of time required for making the test seriously limits the scope of its usefulness. The results obtained with the method described in this paper compare very favorably with those of the lead-acetate method.

There is much to be desired in the method of expressing the weight of coating on wire products in order to have an intelligent understanding as to the weight of coating per unit area. It has been customary to express the weight of coating on wire in pounds per mile, while on sheet products the results are usually expressed in ounces per square foot. Obviously, the coating on wire expressed in pounds per mile would have a different meaning for each gage of wire. If the results are expressed in ounces per square foot of surface on both wire and sheets, there will be a better understanding as to the thickness of coating on the respective products. In stating the weight of coating on galvanized sheets it is customary to express the weight based on one surface only, that is, a sheet containing 2 oz. of coating per square foot really contains 1 oz. on each side of the sheet.

It is proposed to express the weight of coating on wire in ounces per square foot, and also to use such lengths of wire that the number of grams of coating found will be equivalent to ounces per square foot, without calculation. These lengths must be such that the surface coated is equal to 5.079 square inches. It is likewise proposed that the samples for determining the weight of coating on galvanized sheets shall be 2¼ by 2¼ inches (area = 5.079 square inches). The number of grams of coating on a section of this size will also express the weight of coating in ounces per square foot without calculation.

The method for determining the weight of spelter coating consists of using a small amount of antimony chloride in hydrochloric acid (sp. gr. 1.20). Antimony chloride appears to hasten the solution of the coating, and after the coating has dissolved a thin film of antimony plates on the surface of the base metal and retards the solution of iron or steel. Experiments have shown that sheet steel 2¼ by 2¼ inches, which loses 50 mg. in five minutes in cold hydrochloric acid (sp. gr. 1.20) will lose in that time only 1 mg. in the same acid containing 80 mg. of antimony per 105 cc. of acid.

THE METHOD FOR SHEETS.

In the proposed method the metal is immersed in the acid only one minute, which is long enough to dissolve

* Paper read at Atlantic City, N. J., meeting of American Society for Testing Materials, June 22-26, 1915.

several grams of coating, yet the amount of iron or steel dissolved is negligible. The small amount of antimony that plates on the surface of the sample can easily be removed by scrubbing under running water. This method is one of the most rapid and accurate with which the writer is familiar, and a determination can be made in less time than is occupied in making the Preece test.

For determining the weight of coating on galvanized sheets cut several samples 2¼ by 2¼ inches from various parts of the sheet. These samples, about five in number, should be weighed together and immersed singly for one minute in 100 cc. of hydrochloric acid (sp. gr. 1.20), to which has been added 5 cc. of antimony chloride prepared by dissolving 20 g. of antimony trioxide in 1,000 cc. of hydrochloric acid (sp. gr. 1.20). The same 100 cc. of hydrochloric acid can be used for at least five samples. Five cubic centimeters of the antimony chloride, however, should be added for each sample on account of the antimony being removed from the solution by the iron.

TABLE I.—LENGTHS OF WIRE TO GIVE GRAMS OF COATING EQUIVALENT TO OUNCES PER SQUARE FOOT.

Gage No.	Diameter, in.	Length for Test, in.	cm.
0	0.340	4 12-16	12.1
1	0.300	5 6-16	13.7
2	0.284	5 11-16	14.5
3	0.259	6 4-16	15.9
4	0.238	6 13-16	17.3
5	0.220	7 6-16	18.7
6	0.203	7 15-16	20.2
7	0.180	9	22.8
8	0.165	9 13-16	24.9
9	0.148	10 15-16	27.7
10	0.134	12 1-16	30.6
11	0.120	13 8-16	34.2
12	0.109	14 13-16	37.7
13	0.095	17	43.2
14	0.083	19 8-16	49.5
15	0.072	22 7-16	57.0
16	0.065	24 14-16	63.2
17	0.058	27 14-16	70.8
18	0.049	33	83.8

The samples are washed and scrubbed under running water, dried with a towel, and laid in a warm place for a few seconds. The samples are again weighed together, and the number of grams lost is divided by the number of samples taken. Each gram corresponds to 1 oz. of coating per square foot.

THE METHOD FOR WIRE.

A small section of the galvanized wire should be stripped in hydrochloric acid containing antimony chloride. The diameter of the black wire should then be carefully measured in order to determine the length of wire, such that the number of grams of coating will represent the number of ounces per square foot of surface. These lengths are given in Table I. In the lighter wires, however, it will be found convenient to use some fraction of these lengths.

The method of making the test is very similar to that outlined for galvanized sheets, except that the wire is first cleaned wtih carbon tetrachloride or gasoline, and after being carefully weighed is placed in a tall glass cylinder containing hydrochloric acid (sp. gr. 1.20), to which has been added from 2 to 3 cc. of antimony-chloride solution of the same strength as used on galvanized sheets. The reason for using one-half the amount of antimony chloride in the case of wire is on account of taking one-half the area. As previously stated, the coating on galvanized sheets is expressed in ounces per square foot, considering one side only, when in reality this amount of coating represents two square feet of surface. After immersing the entire length of wire for one minute it will be found convenient to pour the acid solution into another tall cylinder in order to facilitate removing the wire. The wire is then scrubbed under running water, wiped, thoroughly dried in a warm place for a few seconds and again weighed. Each gram lost corresponds to 1 oz. of coating per square foot. For direct comparison with the weight of coating as expressed on galvanized sheets, this figure should be doubled.

VANADIUM IN BRASS*

THE EFFECT OF VANADIUM ON THE CONSTITUTION OF BRASS CONTAINING 50-60 PER CENT. OF COPPER.

The following conclusions were reached by R. J. Dunn, M.Sc., and O. F. Hudson, M.Sc., A.R.C.Sc., the authors of a paper read before a recent meeting of The Institute of Metals of Great Britain:

GENERAL CONCLUSIONS.

1. The critical point occurring at about 460° C. in brasses containing the β phase is only slightly affected by vanadium, 1 per cent. raising it not more than 10° C.

2. The usual structure of brasses containing between 50 and 60 per cent. of copper is not greatly modified by the presence of small quantities of vanadium, although alloys containing more than about 0.5 per cent. of vanadium, although alloys containing more than about 0.5 per cent. of vanadium were observed to contain some hard, bluish, slag-like inclusions.

3. Vanadium to the extent of at least 1 per cent. appears to have no influence on the structural stability of the β constituent of the copper-zinc alloys, and if any structural resolution of β into α and γ follows the addition of cupro-vanadium to brass, the result probably is due rather to the relatively large amounts of aluminum usually present in commercial samples than to the small percentage of vanadium remaining in the finished brass.

Analysis of the Brasses.—The analysis of the brasses made in the course of this research was a matter of considerable importance, and one on which some time was spent before reliable methods were arrived at.

Determination of the Vanadium.—The vanadium was obtained in dilute sulphuric acid solution, together with the zinc and any iron and aluminium, the copper having been separated as sulphide. The vanadium was reduced to the state of hypovanadate by sulphurous acid, the iron at the same time being reduced to the ferrous condition. The excess of sulphurous acid was removed by boiling whilst passing a stream of carbon dioxide through the solution.

The hot solution was titrated to a permanent pink color with standard potassium permanganate solution. The permanganate used in this titration was taken up in oxidizing the vanadium and any iron that was present.

The value of the vanadium alone was next obtained by adding standard ferrous ammonium sulphate to the just pink solution until the presence of ferrous ions was indicated on mixing a drop of the solution with a drop of a fresh dilute solution of potassium ferricyanide.

The titrations are best carried out with the solutions at about 80° C.; they should not be allowed to fall below 60° C.

The presence of traces of hydrochloric acid or a chloride must be avoided, as the permanganate readily attacks these in the hot solution.

A TWENTIETH CENTURY ELECTRO-PLATING PLANT

A Description of the Spirella Company's Niagara Falls, New York, Installation.

By G. W. Grupp.*

It was five years ago that the Spirella Company, of Meadville, Pa., known all over the world for their corsets, decided after much debate and serious discussion that they build another plant whose location should be Niagara Falls, N. Y. Niagara Falls was selected for three reasons, namely: First, because the location could be easily remembered by the customers; second, because of its

FIG. 1. EXTERIOR VIEW OF THE NIAGARA FALLS BRANCH OF THE SPIRELLA COMPANY.

nearness to the Falls meant cheaper electrical power, and last, because it was nearer the Canadian border line. Thus the Niagara Falls plant was begun in 1911 and completed in 1913.

At this plant, Fig. 1, which is a large two-story brick and steel structure, the corset is completed in every detail and shipped to all parts of the world. But the thing that is of particular interest is the fact that this building contains the best and most modern equipped plating department in the world. No amount of money was spared to meet every possible point of efficiency, convenience and welfare for both employer and employee in this department. A large part of this is due to C. E. Leffel, the Spirella Company's general superintendent, a man of no mean mark as an inventive genius and electroplater of many years standing in his vocation. This branch supplies all the plating and hardware for all the Spirella Company's plants.

As one walks through the well-lighted corridors toward the plating department he marks the even flow of sweet pure air, not the faintest taint does one smell of odors which are always prevalent near plating establishments. But all the more are you surprised when you enter the plating room. It seems almost impossible to believe, because not for a single minute are you privileged to inhale any chemical fumes. It is a violation of the company's rules. Nothing but pure air is permitted. And to no one less than Mr. Leffel was this a possibility, the inventor of a special form of hood which carries off all injurious fumes.

The plating room (Fig. 3) is 272 x 48 feet. It is well lighted by both natural and artificial means and steam heated, as are all the other rooms throughout the entire plant. In this room sixty-six plating tanks equipped with C. E. Leffel anode hooks are arranged along each side of the room.

Each tank is 10 feet long, 30 inches wide and 24 inches deep. Of the total sixty-six, twenty-two of these tanks contain hot cyanide of copper solution. A hood of special form, designed by Mr. Leffel, prevents the fumes from escaping into the plating room. This is accomplished by two electrically driven suction fans which draw the injurious fumes from the tank by means of a pipe which is attached to the hood to a concrete duct which in turn leads to a 50-foot stack.

Another thing of interest concerning these tanks is the Leffel adjustable plating racks, which permit adjustments to be made at three depths in a single solution. In other words, as the plating solution is gradually being used up the rack may be adjusted three times to comply with the existing conditions; a gradual lowering of the level of the solution. This rack is so arranged that the solution cannot affect it.

Also, another thing of interest about these tanks is the Leffel anode hooks which were described at some length in the October, 1912, issue of The Metal Industry.

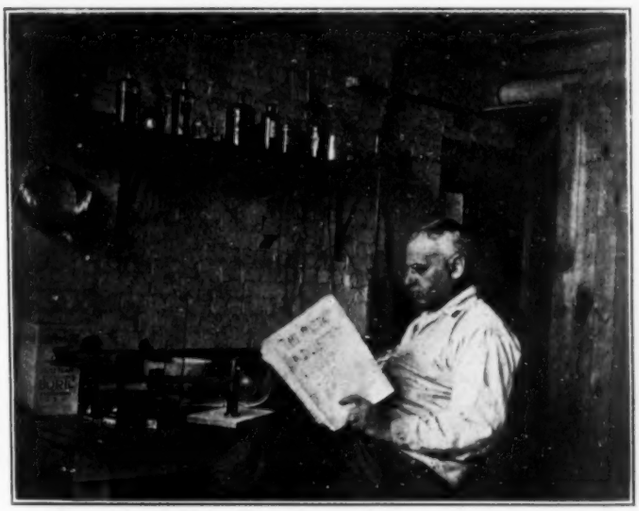


FIG. 2. C. E. LEFFEL, SEARCHING THE METAL INDUSTRY FOR A FORMULA.

Directly under the plating room, on a mezzanine floor, the generator room, 12 x 272 feet, is located, which is equipped with twenty-two separate units. The machines on the left hand side, as shown in the accompanying picture, Fig. 5, are direct connected sets, 6 volts, 600 amperes; while those on the right are 7 volts, 1,000 amperes. Each direct connected set is separately excited. The larger machines are used for the plating units on the second floor, also the plating apparatus on the first floor. Then in addition to these twenty-two separate units located on this floor, two 15-volt, 1,000-amperes cleaning dynamos which operate the apparatus in the two special electro-cleaning rooms (Fig. 6), which are 18 x 18 feet.

All of the Spirella Company's casting of anodes, etc., which are of special composition, are cast within the very walls of this plant in a little foundry 15 x 20 feet.

All metals, such as copper, nickel and zinc, which are

*Editorial staff.

†This plant was shown partially by pictures in The Metal Industry for January, 1913.

used in the manufacture of a corset are housed in a 15 x 15-foot metal vault whose capacity is several tons. By so storing the metals they are always safe from fire and theft.

The chemical storage room, which is 14 x 22 feet, is constructed entirely of concrete and equipped with concrete bins. Each bin is labeled as to the chemical it contains. A room of this construction they say saves much space which under ordinary conditions would be occupied by boxes and barrels, etc. The acid storage room is also 14 x 22 feet and contains fifty carboys.

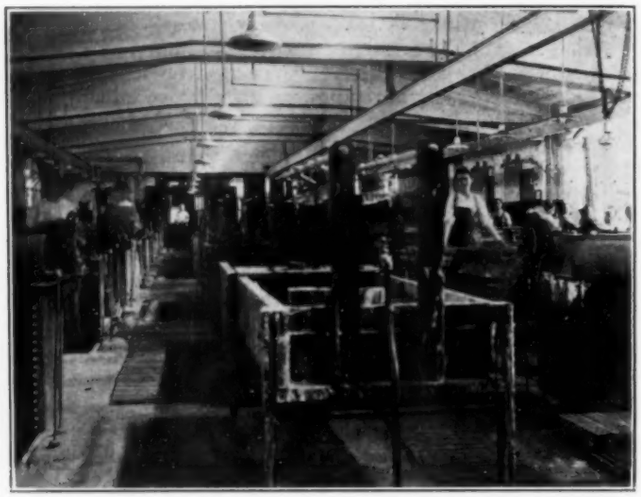


FIG. 3. PLATING ROOM ON THE SECOND FLOOR SHOWING THE ARRANGEMENT OF THE CYANIDE AND OTHER TANKS.

As the building is oblong in shape with a large court in the center, this space has has been utilized without affecting the lighting of the plant by installing a large cistern. This cistern has a capacity of 500 barrels. In this cistern filtered water is kept for plating uses. The water is brought into the building by means of a pump which forces the water to every tank throughout the plant.

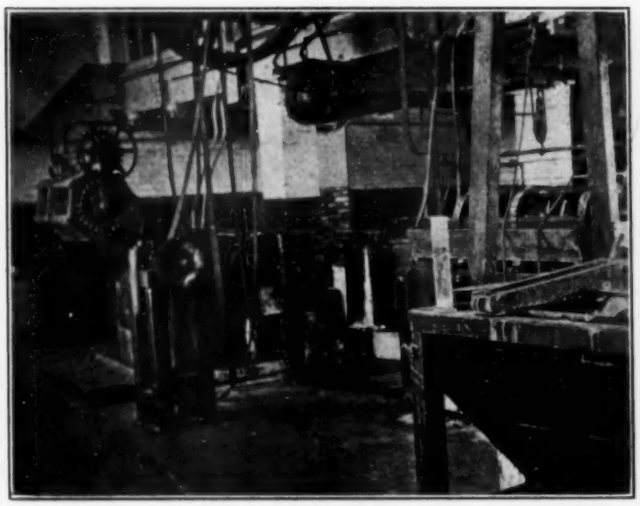


FIG. 4. POTASH WASH ROOM ON THE FIRST FLOOR.

In a little secluded corner of the plant an experimental room (Fig. 2), 20 x 20 feet, may be found. This room, which is fully equipped with chemicals, electrical apparatus, etc., is being constantly used by Mr. Leffel, who tests all of the Spirella Company's goods, and it is also here that he experiments in order to discover newer and better processes of plating, etc. Every new Spirella idea is tried out in this little room of mysteries.

And for further study of the Spirella corsets and the products of which they are made, photographs are made both microscopic and ordinary which are taken and made in a specially constructed room.

Then in addition to all these modern and up-to-date things the Spirella people have not forgotten their employees, as they provided a large combination wash, toilet and locker room for the exclusive use of the employees. Here the employees may not only wash themselves, but bathe themselves, as shower baths with running hot and cold water have been provided for their use.

FIG. 5. THE GENERATOR ROOM WHICH IS EQUIPPED WITH 22 SEPARATE UNITS.

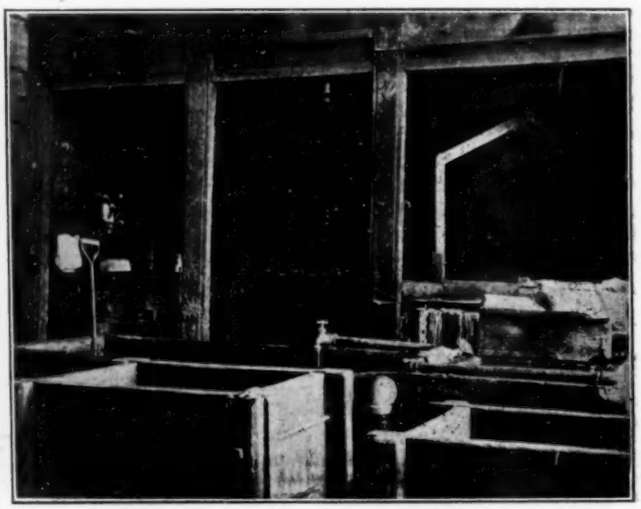


FIG. 6. ONE OF THE ELECTRIC CLEANING ROOMS.

Summing up the Spirella Company's Niagara Falls plating department in a sentence, it has the most modern and best equipped plating department in the world where both employer and employee's welfare were taken into consideration.

THE ART OF CASTING FROM LIFE

A Novel Reproduction in Bronze Using a Natural Object for a Pattern

By W. Bilz.

The casting shown in the illustrations is not a lost wax production. It is merely a casting made in the old-fashioned way, with regular molding sand, generally termed false core work. The crab, after being cut into sections—the body, shell and the claws—were placed in a plain sand mold side, and the mold was made in the usual manner, as when working from solid metal patterns. After the mold was finished and the patterns

FIG. 1. THE COMPLETED BRONZE CASTING MADE BY USING A CRAB FOR A PATTERN.

FIG. 2. SHOWING THE TWO BRONZE SCREWS HOLDING BODY AND LEGS TOGETHER.

FIG. 3. SHOWING THE MARKS ON THE SHELL FAITHFULLY REPRODUCED.

were removed, the body was cored out, in order to leave room for a small glass receptacle or ink well. After the casting was finished, the various sections were carefully removed from the gates, filed and finished in the same manner as any other fine bronze work, and then colored. The parts were then assembled, the body and claws being put together with only two screws as shown in Fig. 2.

Owing to the scarcity of French sand at the time this piece was made, a mixture of Albany sand and clay was used, i.e., 9 parts of Albany sand and 1 part ordinary fire clay were substituted, and then rolled thoroughly and carefully sifted. The art of producing fine bronze, brass or silver work is not merely a question of material, but requires the skill of a good molder as well. A good many firms furnish the best of materials, but after all it is a matter of workmanship to get good castings and to make this possible, it requires years of study and actual experience.

It is far cheaper to produce fine bronze work as described above, than casting by the lost wax process, for with this process it requires a plaster or glue mold in order to reproduce the parts in wax, consequently every time a mold is made, it loses the first impression or sharpness of the original model. The wax must then be poured into the plaster mold, to produce a wax pattern and from this the casting is finally made, making three impressions from the original pattern, consequently it is impossible to retain the fine impression as when made directly from the first pattern.

SOME METAL STATISTICS FROM THE UNITED STATES GEOLOGICAL SURVEY

INFORMATION RELATING TO THE RECOVERY OF SECONDARY METALS, AND THE PRODUCTION AND CONSUMPTION OF COPPER AND ALUMINUM.

The United States Geological Survey, which has issued a report on the recovery of secondary metals in 1914, describes the efforts that have been made to put this industry on a more systematic basis through the formation, in that year, of the metal section of the National Association of Waste Material Dealers, and gives the details of the production, under this classification, of copper, lead, zinc, antimony, tin, and aluminum. It explains in introducing the summary of reports that "secondary metals" are those recovered from scrap metal, sweepings, skimmings, drosses, etc., as distinguished from those derived from ore, which are termed "primary metals." The reports received do not include the large quantity of iron and steel remelted, and no figures are given for nickel, gold, silver, or platinum.

RECOVERY OF SECONDARY METALS.

The following table shows the recovery of secondary metals in the United States, in short tons, with their values, in 1914 and 1913, the decrease in value being due partly to smaller output and partly to lower average prices for copper, zinc, lead, tin, and aluminum:

	1913		1914	
Metal.	Quantity.	Value.	Quantity.	Value.
Secondary copper, including that in alloys other than brass	66,980	$20,536,068	58,556	$15,435,362
Remelted brass	99,315	24,651,969	99,038	21,054,300
Secondary lead	33,104	6,409,392	29,337	4,762,836
Recovered lead in alloys	39,730		31,725	
Secondary spelter	50,005	6,019,776	42,969	4,782,066
Recovered zinc in alloys other than brass	3,743		3,914	
Secondary tin	6,415	12,567,379	4,535	8,887,158
Recovered tin in alloys	7,763		7,912	
Secondary antimony	45	401,963	1	444,844
Recovered antimony in alloys	2,660		2,645	
Secondary aluminum	2,198	2,199,480	2,791	1,673,140
Recovered aluminum in alloys	2,456		1,731	
Total	314,414	$72,786,027	285,154	$57,039,706

Stocks of secondary metals in the United States were fairly large at the beginning of 1914, and metal prices were low during most of the year, so that the trade in waste metals and drosses was smaller in volume and less profitable than usual, but advancing metal prices during the latter part of the year and good stocks of most metals available to take advantage of higher prices made more favorable trade conditions. The result was that, on the whole, business for the year was not as bad as anticipated.

PRODUCTION AND CONSUMPTION OF COPPER.

The total production of new refined copper in 1914 was 1,533,781,394 pounds, a decrease of 81,286,388 pounds from the 1913 output.

The production of electrolytic, lake, casting, and pig copper from primary sources and the production of secondary copper by the regular refining plants in 1913 and 1914 is shown in the following table:

PRODUCTION OF PRIMARY AND SECONDARY COPPER BY THE REGULAR REFINING PLANTS IN 1913 AND 1914.

[In pounds.]

	1913.		1914.	
	Domestic.	Foreign.	Domestic.	Foreign.
Primary:				
Electrolytic	1,022,497,601	378,243,869	991,573,073	323,358,205
Lake	155,715,286	.....	158,009,748	.....
Casting	22,606,040	.....	21,506,325	.....
Pig	36,004,986	.....	39,334,043	.....
Total primary	1,236,823,913	378,243,869	1,210,423,189	323,358,205
	1,615,067,782		1,533,781,394	
Secondary:				
Electrolytic	14,862,577		27,702,928	
Casting	22,360,182		4,224,052	
Total secondary	37,222,759		31,926,980	
Total output	1,652,290,541		1,565,708,374	

The apparent consumption of refined new copper in the United States in 1914 was about 711,268,000 pounds. In 1913 it was about 812,268,000 pounds.

CONSUMPTION OF ALUMINUM.

The consumption of aluminum is constantly expanding, and aside from its use in the manufacture of cooking utensils, it is being employed in the construction of automobile castings and of welded tanks used by brewers, preserve manufacturers, and fat renderers and for wire for power-transmission lines. Other uses which are important in their adaptability and efficiency, but which absorb only a small portion of the domestic product, are the manufacture of powdered metal used as a paint pigment and in making aluminum foil. Aluminum foil is gradually displacing tin-foil, which heretofore has been used for wrapping cheese, candies, tobacco, tea, and other products.

EDITORIAL

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NEW YORK, AUGUST, 1915.

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Vol. 13. No. 8.

THE METAL INDUSTRY

With Which Are Incorporated
THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS.

Published Monthly

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CONTENTS

SCRAP METALS OF THE WAR

The European war is one year old to date, and the end is not yet in sight. For a whole year all kinds of metals have been used lavishly by the nations at odds. Iron, steel, copper, brass, tin, lead, nickel, aluminum, magnesium, antimony, quicksilver and others have been collected in enormous amounts, distributed again over various sections of the country and there scattered broadcast to lie to rust and corrode. Even gold and silver are playing their part in providing the other metals and sending them on their way to the scrap heap. Will these metals ever be recovered? It is conceivable that they will be and are perhaps even now being gathered up and put into shape for reuse. This is particularly true of those metals that have a high intrinsic value such as copper, brass and nickel, though there probably will not be enough of the last found to amount to much.

It is the brass and other copper alloys, however, that offer the most inducement to metal collectors, if there are any on the other side. Up to April 1 of this year there had been shipped abroad over 22,900,000 pounds of brass and probably as much more has gone since that time, as shipments have been rapidly increasing. All of this brass may be regarded as being recoverable in some shape or other. Will any of it find its way back to where it was made? It is possible and many problems will then present themselves to the metallurgist which he must solve before new brass can be produced. This reminds us of an incident of the Spanish-American war. Some time after the war a large shipment of brass cartridges that had not been exploded in the war was sold to a large brass mill. The cartridges were exploded by being put into an annealing furnace. The leaden bullets were melted into a mass by this process and were separated from the brass. The cartridge cases were sent to the casting shop to be used in making new brass. As cartridge brass contains at least 70 parts of copper, it was supposed that the shells would make good brass. When the casters tried to melt these shells it was found that the residue from the powder formed so much dross that it was impossible to use them in this way. The next step was to sell them to a smaller mill that also purchased brass from the larger one. The small mill also tried to melt them, with the same result, and when the large mill received back a shipment of scrap (from its own metal), in the form of what is known as "cabbages," Lo and behold, in the center of the "cabbages" were the offending cartridge shells! The final disposition of this troublesome lot of metal was to the copper refinery where the spelter was burned and the copper recovered. From this experience it would seem that good brass

could not be made from exploded cartridge cases. Possibly those which contain smokeless powder will not offer the same difficulty, but we are not certain of this. However, if this is so we can figure on 30 per cent. of 40,000,000 pounds of brass or 12,000,000 pounds of spelter being lost to the brass trade out of the first year of the war. The copper can be figured as practically all recoverable with the regulation shrinkage for remelting.

CORRESPONDENCE AND DISCUSSION

WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ARTICLES PUBLISHED IN THE METAL INDUSTRY

BAR NICKEL ANODES VS. FLAT

To the Editor of THE METAL INDUSTRY:

In the instruction for nickel plating the exposed surface of the anodes is recommended to be slightly in excess of the work surface. I find this statement misleading. If the anode surface is equal to the work surface and the solution in good condition, the corrosion of the anode will nearly maintain the metal in the solution. Experience shows that the anodes dissolve more from the edge than from the center, showing that circulation around the anode is necessary to get the greatest amount of corrosion of the anode; therefore, bar anodes should be used.

I visited a plant a while ago where they were using the old style flat anode. The anodes were in the tub for two years and they were not more than two-thirds worn out. The tub was a 500-gallon one. They used the tub every day and in that time the anodes should have been all worn out. Instead of using the nickel from the anode, they were using the metal from the solution. They used 25 pounds of nickel salts per week in the tub at 9 cents per pound. Nickel ammonium sulphate contains about 14 per cent. of nickel; they were adding about 3½ pounds of metal per week to the solution at a cost of 63 cents per pound. Now, then, if they had used the nickel from the anodes, the nickel anodes, 96.97 per cent., cost 48 cents per pound, a saving of 15 cents per pound, not figuring the labor in dissolving salts. Now, then, if they had used bar anodes that had a circulation all around the anode, the corrosion would have been nearly double, and they would not have used over 25 pounds of salts per month, a saving of $21 per year on one tub That seems small, I know, but here is the point: I have 42 tubs of about the same size, all of which have bar anodes. Now, 42 x 2,100 equals $882 a year saved on nickel salts. Does that pay? Then, how about the scrap? A 500-gallon tub will take 500 pounds of nickel anodes; the flat anodes have 20 per cent. scrap, or 100 pounds to each tub. The scrap cost 48 cents per pound and sells for about 20 cents per pound. Lost $28 on one set of anodes. Now by using the bar anodes, as they wear away they give space between, so when you are losing anode surface a new one is placed between the old one. In that way the old anode is left in as long as there is nickel on the hook and the scrap is not over 5 per cent., or 25 pounds, per set of anodes. Twenty-five pounds of scrap sells for $5 and cost $12, so the loss is only $7 on each set of anodes of 500 pounds. At the present time I am using 25 sets of anodes a year, so $25 \times 7 = \$175$ a year lost on bar anodes from scrap. On the old style flat anodes my loss would be $25 \times 28 = \$700$ per year on scrap. I am not selling nickel anodes, but from the results I am getting from the bar anodes, I feel that they deserve the credit I have given them.

J. A. HALL.

New Britain, Conn., July 20, 1915.

NICKEL PLATING ON ZINC

To the Editor of THE METAL INDUSTRY:

Mr. Proctor's article on nickel plating on zinc in the July number of THE METAL INDUSTRY brings to mind a little similar trouble, which, however, was easily bridged. A great many platers' difficulties may be traced to their unwillingness to examine the cause. Nickel plating on zinc forms a good example. In the ordinary nickel solution zinc will streak very naturally when one stops to think of the nature of the metal and the reaction with the acid solution. Zinc is employed in many chemical reactions as a reducer; it reduces oxides and becomes oxidized itself. Furthermore, there is a reducing action at the cathode which is characteristic of any electrolysis. The two factors attack the nickel sulphate and reduce it to nickel sulphide and not zinc sulphide, as Mr. Proctor says. It is this nickel sulphide which forms black streaks on the work.

If the reader doubts this let him take a "streaked" zinc cathode and rinse off all nickel solution, then put a drop of concentrated nitric acid on the black deposit, neutralize it with a drop of concentrated ammonium hydroxide and add a few drops of dimethyl-glyoxyme dissolved in grain alcohol. A deep red color will soon show the presence of nickel. If the black deposit be washed into a beaker and thoroughly rinsed, then tested for zinc, that metal will be found absent.

Knowing the diagnosis we seek a remedy. The simplest one which suggests itself is to use a neutral solution which will not attack the zinc. To this end I tried several reagents and among them found potassium citrate to be the best. A solution made up of:

Single nickel salts	8 ozs.
Potassium or sodium citrate	4 "
Sodium chloride	2 "
Water	1 gal.

This gave excellent results, both in the plating room and in the laboratory. There is little doubt, however, but that an ordinary nickel solution with sufficient nickel carbonate added to neutralize the free acid and then four ounces per gallon of potassium or sodium citrate added will answer the purpose just as well.

W. H. WEBER.

Waterbury, Conn., July 26, 1915.

A FULL DOLLAR'S WORTH

To the Editor of THE METAL INDUSTRY:

After returning home from my holiday I find yours of June 10, 1915, calling my attention to renewal of subscription to THE METAL INDUSTRY. As I happen to have one good American dollar left I do not know of any better use for it than a year's subscription to THE METAL INDUSTRY. You will therefore find it enclosed in this letter.

H. FRENCH
Superintendent De Laval Manufacturing Company.

Peterboro, Ont., July 17, 1915.

NEW BOOKS

HOW TO MAKE JEWELRY. By George S. Overton. 5½ by 7¾ inches. 228 pages, including index. Numerous illustrations. Bound in cloth. Published by Walter B. Frost & Co. Price $1.50. For sale by THE METAL INDUSTRY.

This work has been written by a man who has been foreman and superintendent of gold and silver shops and consequently the book deals largely with the making of jewelry from the precious metals. There are, however, supplementary instructions relative to making work in rolled plate.

The book is eminently practical and the matter is presented in such a way as to make it entirely possible for the beginner to produce creditable work by following the instructions. The work is made up of forty-nine chapters and appendix. Some of the interesting titles of these chapters are: Wire Drawing and Working, Tips on Soldering and Stone Setting, Silver and Its Alloys for Jewelry Work, Silver as a Base for Black Enamel, The Buying of Stones, Refining Polishing Sweeps, Recovery of Gold and Silver from Scrap, etc.

SHOP PROBLEMS

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY.

ASSOCIATE EDITORS: JESSE L. JONES, Metallurgical PETER W. BLAIR, Mechanical CHARLES H. PROCTOR, Plating

ALLOYING

Q.—Kindly publish a formula for a good inexpensive copper hardened babbitt suitable for bushing polishing spindles. Also a good formula for trolley wheel. We have been making trolley wheels for some time but do not seem to get the mileage that we should. We have tried mixtures as expensive as 88-10-2, but they do not seem to wear any better than a cheaper grade of red brass.

A. The following is a very good and inexpensive babbitt metal, viz.:

Antimony	16.25
Copper	.25
Lead	78.25
Tin	5.25

The copper may be added by making an alloy of equal parts of copper and antimony.

The best mixture for trolley wheels is

Copper	92
Tin	6
Zinc	2

Care should be observed to get the tin thoroughly and uniformly alloyed.—J. L. J. Problem 2,172.

CASTING

Q.—I am trying to obtain a metal mixture suitable for castings of reasonable tensile strength that will finish similar to a "silver brush finish," the casting to have the same color all the way through and of reasonable cost. These castings are to be used in hospital work. In nearly all mixtures so far, any such castings, after being poured and cooled, are extremely brittle. Can you suggest any mixture that would answer the above requirements?

A.—The alloy known as "Silvel" metal produces very satisfactory sand castings at a reasonable cost. The color approximates that of the "silver brush finish" and the tensile strength may approach that of mold steel, while its ductility is such that it may be rolled into sheets and spun or stamped. —J. L. J. Problem 2,173.

CEMENTING

Q.—Will you kindly advise me what kind of a cement will hold glass and metal together?

A.—We would suggest that you try the following formula:

Boiled oil	6 pounds
Copal varnish	6 pounds
Litharge	2 pounds
White lead	1 pound

The above formula is all made up in the form of a paste.

Or, No. 2.—Make a paste of sulphur, sal ammoniac and iron filings—equal parts, with boiled oil to the consistency of putty.—K. Problem 2,174.

DEPOSITING

Q.—Can I obtain a heavy gold or silver plate by using a series of light, and which would you advise me to do, dissolve the gold or will chloride of gold answer the same purpose?

A.—You can obtain a heavy gold or silver deposit from lights provided you have a method of transforming the current down to 1 to 2 volts with sufficient amperage to do the work. You can use chloride of gold for plating, but it is better to precipitate in the form of an ammonuret of gold by precipitating with water ammonia.—C. H. P. Problem 2,175.

DIPPING

Q.—Kindly give me a black dip for aluminum or some method that will blacken it and stick. I have used the following formula, but it does not stay on the aluminum:

Chloride of zinc	1 pound
Sulphate of copper	1 ounce
Hot water	½ gallon

The dip is to be used on gun work.

A.—Aluminum is a somewhat difficult metal to produce a black upon. We suggest a solution be made up according to the following proportions. Dissolve 8 ounces of white arsenic in ¾ of a gallon of muriatic acid by the aid of heat. Then add 8 ounces of sulphate of iron and ¾ of a gallon of water. Mix the solution thoroughly and use at a temperature of a 100 degrees. Immerse the articles until sufficiently black, then wash and dry out carefully and lacquer or coat the surface with boiled linseed oil.—C. H. P. Problem 2,176.

FINISHING

Q.—We are having a call for verde antique on drawer pulls, these pulls are made of steel and we are having difficulty in getting a satisfactory finish. We have tried verdegris and muriatic acid but this rusts the pulls, we have also tried verdegris and lacquer, this also does not work satisfactory. Can you give us a formula?

A.—You will probably have the same difficulty of rusting with any of the verde combinations, especially when applied to plated iron articles. This is due to the fact that they all contain chlorine combinations which have a tendency to rust iron very rapidly.

The following method will probably overcome your difficulty and give you satisfactory results. Follow the methods you have previously pursued as far as the plating is concerned and dry out carefully as usual, then lacquer the articles with a lacquer that contains an excess of gum varnish (a transparent lacquer will not answer the purpose). If you cannot obtain such a lacquer from the lacquer people then purchase from W. Zinsser & Company, 196 William street, New York, a sufficient quantity of white French varnish. Mix this varnish with an equal quantity of a mixture of equal parts of fusel oil and amyl acetate, when you are preparing to use it. This forms the lacquer of years ago, previous to the advent of celluloid lacquers. If the articles are to be dip lacquered or sprayed use two parts of the thinner to one part of the varnish. Dry the articles afterwards by heat in the usual manner.

Now prepare a green color made up from a combination of dry light chrome green, zinc white, a little soluble blue and, if necessary for darker greens, a little ivory black. Mix up to a thin paint with pure spirits of turpentine and then add a few drops of hard oil finish varnish or turpentine copal varnish. A teaspoonful to a pint of the color will be ample. Too much gives the color when applied a painty or sticky appearance. When the color is mixed up to the right shade and consistency applied to the lacquered surface with a painters sash brush, about ½ inch in diameter. Apply a very little of the color to the brush and give a stippling motion. This will give the variegated effect when dry. After the color is applied dry as usual for lacquering and afterwards cool for several hours. This will harden the color.

To bring out the tone of the color wax the surface. This may be done by going over the surface with a goats' hair brush or a small canton flannel buff wheel may be used, the speed should not exceed 750 to 1,000 revolutions per minute. This gives the egg shell finish or semi-opaque lustre.—C. H. P. Problem 2,177.

MELTING

Q.—The brass foundry where I work has always used all new metals, but since the war prices for copper, tin and spelter have come in, they are trying to use some scrap brass. Their castings must be close grained, as they are used on hydraulic work, and must be able to withstand a water pressure of at least 100 pounds.

What do you recommend to be used with scrap brass, for the purpose of clarifying and purifying same, so as to make it suitable for the above purpose? We have had recommended to us both phosphor tin and phosphor copper, and would like your advice on either or both, or do you know of anything better? Which would cause the greater shrinkage in the metal? Would it be advisable to remelt this scrap into pigs and then use it, or could just as good results be obtained by putting this scrap in with some new metals and melting all down together?

A.—Close grained castings for hydraulic work and to stand a water pressure of a hundred pounds must first, last and all of the time be made from good material.

The above does not necessarily disbar the use of scrap, provided it is good and clean. A favorite mixture for such work is known as steam metal and usually consists of 85 parts of copper and 5 parts each of tin, lead and zinc. If you have some good clean scrap, either high or low brass mixture, and know the copper contents, it is an easy matter to melt this metal and to use it, provided it is kept covered with a layer of charcoal and common salt, when the resulting metal may be used to make pressure-proof castings.

There are several deoxidizing reagents which may be used with success, and of these you can use either phosphor copper or tin, and also manganese and silicon coppers. The amounts that will produce the best results of these reagents should be so proportioned that the resulting casting will not show more than .05 of 1 per cent. of phosphorus, not more than .1 of 1 per cent. of silicon and not more than .5 of manganese. These results, of course, are arrived at by careful analysis of the material before and after using.

In relation to the question as to whether it would be better to remelt the scrap and pour it into pigs, that depends altogether on the condition of the scrap. If the scrap is fairly clean, free from solder and other such impurities, it may be used direct by feeding it into a bath made of new stock, but if rather dirty the safest procedure would be to melt it and cast into rough ingots and then ascertain the composition of the ingots and use these in making up the desired mixture.—K. Problem 2,178.

MOLDING

Q. Will you please give me all the information you can in regard to White Bronze? This is the trade name given to refined and purified zinc and used by a certain firm in the manufacture of monuments and who claim it to be far more permanent than marble or granite. The metal is light gray in color.

A.—"White Bronze" spelter is a refined grade of zinc procurable in the market and its analysis is as follows:

Zinc	99.79
Cadmium	Trace
Iron	.04
Lead	.17

This zinc is used by many manufacturers of die castings. Monuments made of a pure zinc like this metal ought to be very lasting. The reason for this is that the zinc becomes coated with a thin layer of oxide that prevents further deterioration. Any pure zinc would answer for making monuments fully as well as the white bronze.—J. L. J. Problem 2,179.

PLATING

Q.—Kindly answer the following questions: First—How can I determine the amount of cyanide and the amount of silver in a silver plating solution?

Second—Is bisulphate of carbon good as a brightener for a silver deposit solution?

Third—How can stearin be taken out of silver solution?

Fourth—What is the meaning of ampere hours in a battery?

Fifth—What is the best gold plating solution which would stand an acid test?

A.—First—You can only determine the amount of silver and cyanide in a solution by analysis. All text books upon plating give the method of analysis which is comparatively simple if you have the apparatus to do it with.

Second—Bisulphate of carbon will act equally as good in a silver solution used for silver deposit work as in a regular solution. It is preferable to use 3 parts of carbon to 4 or 5 parts of ether dissolved in strong cyanide solution, and then only add two or three drops per gallon of solution.

Third—Stearin is best removed from a silver solution by boiling the solution, so that it becomes concentrated, due to the evaporation of the water. When the solution again becomes cold the stearin or stearic acid will come to the top of the solution like fat or oil upon water. This can then be readily removed and water again added to replace the amount lost by evaporation in boiling.

Fourth—The meaning of ampere hours when applied to a storage battery is that it will give a certain number of amperes consecutively without fluctuations for a stated number of hours, viz.: 30 amperes for 30 hours or 20 hours, depending upon the size of the battery.

Fifth—Any gold deposit above 8 karats will stand the nitric acid test so that copper or silver may be added to an ordinary gold solution to produce the percentage of the alloy. Usually karat gold alloys are drawn into the solution from the anode by the aid of a porous cell. This gives the best results.—C. H. P. Problem 2,180.

STRIPPING

Q.—I am using brass rods for plating racks and after using them a short time they become coated with nickel. The racks are quite expensive to make, so I would like to know if you could give me any information as to removing the nickel without spoiling the racks.

A.—To remove the nickel from your racks we suggest that you prepare an electro-strip for the purpose. To accomplish this arrange a solution consisting of 1 gallon of water and sulphuric acid added until 30 degrees is reached. This would require nearly equal parts of acid and water. Then add 4 ounces of sodium sulphate per gallon of water. This solution should be arranged in a porcelain jar or other receptacle so that one or more frames may be stripped at one time. Use a reverse current, making the racks the anodes and pieces of lead or carbon the cathodes. The racks should hang between two lead or carbon plates so that the nickel is removed evenly. We believe this method will answer your purpose, especially if your racks are made from brass.—C. H. P. Problem 2,181.

SWEATING

Q.—Can you give us any data on the economical utilization or recovery of babbitt from babbitt dross? This dross is from a genuine babbitt metal, the dross analyzing as follows: 6 per cent. antimony, 6 per cent. copper, 80 per cent. tin and about 8 per cent. oxygen. You will readily note the dross is not a pure oxide or its metallic content would be lower, while its oxygen content would be about 21 per cent. Much of this dross is very fine, 50 mesh or better, which, upon slight rubbing, is quite metallic in appearance under the microscope. The dross is essentially small globules of metal coated with oxide.

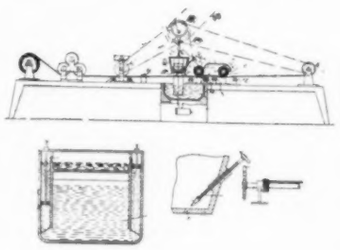
A.—From genuine babbitt dross of the character described, possibly 50 per cent. of metal may be recovered by a simple sweating operation; the dross being placed in a sweating furnace with an inclined hearth and gently heated. The residue is best sold to a smelter, as it must be heated to about 2,500 degs. F. in contact with a reducing agent in order to be reduced to the metallic state again.—J. L. J. Problem 2,182.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY

1,142,856. June 15, 1915. **Apparatus for Coating Sheet, Plate and Rolled Metal.** L. S. Stoddard and Birthold Goldsmith, of Lisbon Ohio.

This invention relates to apparatus for coating roll, sheet and plate metals or alloys, with a coating of metals or alloys, and more particularly to apparatus for coating such metals or alloys on one surface only.

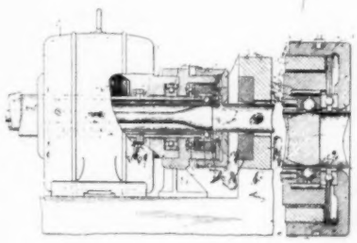


The object of the invention is to provide for this purpose an apparatus of simple construction, as shown in cut, whereby roll, sheet or plate metals or alloys can be rapidly and thoroughly coated with a substantially uniform layer of the coating metals or alloys, and whereby the coating material is prevented from being deposited on the edges and the opposite surface of the metals or alloys being coated—and also prevented from being wasted through excessive oxidation and otherwise.

1,143,101. June 15, 1915. **Metal Drawing Machine.** L. H. Brinkman, Glen Ridge, N. J. Assignor to Baltimore Tube Company, Baltimore, Md.

This invention relates to metal drawing machines and more particularly to machines for drawing metal tubes and rods.

One of the objects of the invention is to provide a durable and efficient machine by which metal tubes or rods of considerable length may be rapidly drawn down to the desired diameter.



Another object of the invention is to provide a metal drawing machine, as shown in cut, having a rotary ball die and a finishing die through which dies the tubes or rods are drawn, the ball die serving to reduce the diameter of the tube a considerable amount at each draw, while the other die serves to smooth out any unevenness or ball marks in the tubes or rods and give them a good finish and a uniform diameter.

Another object of the invention is to provide a rotary ball die which may be adjusted to given desired diameters, preferably without shutting down the machine, so that after each "draw" the die may be adjusted to reduce its diameter to a given size for the succeeding "draw" without shutting down the machine.

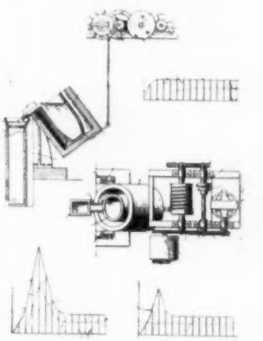
1,144,000. June 22, 1915. **Treatment of Surfaces of Aluminum or Alloys of Aluminum in Order to Prepare Them for Receiving a Metallic Deposit.** François Auguste Roux, of Paris, France, assignor to Société L'Aluminium Francais, of Paris, France.

This is a process for the electro-plating of aluminum and the patent is based on the following claim:

A process of treating surfaces of aluminum or its alloys to prepare them for receiving a metallic deposit, which consists in subjecting the previously cleansed surfaces to the action of a weak bath containing a hydracid holding a soluble metal in solution, thereby to precipitate a deposit of said soluble metal upon said surfaces and to liberate hydrogen which remains occluded in the deposit where it adheres to said surfaces, rinsing said surfaces, passing the surfaces through a hot bath constituted by a saturated solution of a salt capable of expelling the occluded hydrogen and of fixing on said surfaces the soluble metal employed, and immersing said surfaces in a mineral acid solution.

1,143,215. June 15, 1915. **Apparatus for Casting Metal Ingots.** C. W. Lummis, Worcester, Mass.

The present invention relates to improvements in apparatus, shown in cut, for casting metal ingots in which metal, in a molten state, is poured from a container, such as a crucible or tilting furnace, into a mold or the like, to form an ingot.

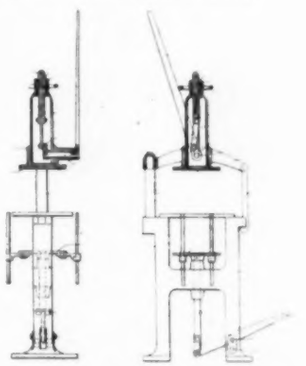


The apparatus of the present invention is especially applicable to the making of ingots of relatively small cross-sectional area, the casting of which must be closely regulated to insure soundness, and freedom from dirt or slag.

The pouring of the molten metal from the container into the mold, ordinarily effected by manual manipulation, must be conducted with the greatest of care, in order to obtain a homogeneous product capable of being rolled, drawn, or extruded into sheets, rods, wires, or tubes. If the pouring proceeds too slowly, foreign matter, such as dirt, dross, or slag, will be present in the finished ingot, since the solidification of the metal under a slow rate of pour occurs too close to the level of the molten metal as the pouring proceeds. On the other hand, if the pouring proceeds too rapidly, the finished ingot is liable to be defective by reason of improper shrinkage.

1,144,400. June 29, 1915. **Hand Molding Machine with Lifting Arrangement.** Antoine Utard, of Longeville, France.

The present invention relates to a hand operated molding machine having its pressing and lifting devices disposed in such a manner that the various operations are made very easy and that pieces of any shape may be molded on any system of pattern plates, the mold boxes being of any shape and size consistent with the dimensions of the machine.



The machine is a universal one, because of the great variety of pieces which can be molded therein, the various pressing and lifting devices being made adjustable.

The invention is shown in the accompanying drawing.

1,144,523. June 29, 1915. **Metal Coating Process.** J. C. Beneker, Cincinnati, Ohio.

This invention deals with the art of coating relatively corrosive metals with a protecting film, and it is concerned more especially with a method whereby a uniform and continuous

film of lead or alloys thereof may be successfully and tenaciously applied to surfaces of iron.

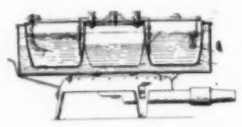
The patent covers: A process of the nature disclosed for lead-coating iron surfaces, consisting in initially obtaining a clean iron surface, and then contacting the same with a fused lead-bearing bath in the presence of metallic cadmium.

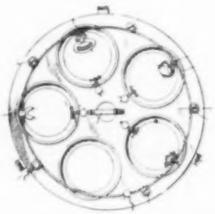
1,144,226. June 22, 1915. **Electro-Plating Process.** C. B. Mills, Baltimore, Md.

This invention covers a process of electro-plating cement, glass, plaster of Paris, wood and other non-metallic substances. The principal claim is for the composition of the bath in which the article is boiled before it is plated. The inventor claims: The process of electro-plating non-metallic substances, which consists in first treating the article with a moisture and acid-proof filling and coating solution of asphaltum, methylated spirits, stearic acid and glycerine, then applying a sizing coating, then applying an adhesive ground coating of litharge, asphaltum, methylated spirits and a suitable gum resin, then applying a powdered conducting material, and finally electro-plating the surface thus prepared.

1,144,680. June 29, 1915. **Electro-Plating Apparatus.** H. S. Allers, Buffalo, N. Y.

This invention relates to an electro-plating apparatus which is more particularly designed for use by jewelers for the purpose of electro-plating articles which have been repaired by the use of solder or otherwise and require a thin coating of metal, corresponding to the main part of the jewelry, to be deposited over the solder joints and other parts preparatory to polishing and finishing the job suitable for handling over to the customer.

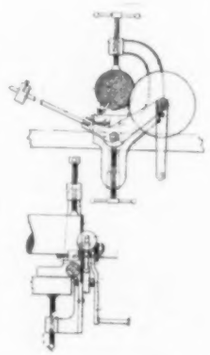




It is the object of this invention to produce an apparatus, as shown in cut, for this purpose which is comparatively simple and inexpensive in construction, which can be operated at low cost, which enables the jeweler to produce at a minimum cost electro-plating solutions of various metals and colors of metals preparatory to performing the actual electro-plating operation, and which enables a jeweler to electro-plate different jobs with different kinds and colors of metal at the same time in his own establishment without necessitating sending the same out to another plating works for this purpose.

1,144,867. June 29, 1915. **Machine for Sawing Metals.** E O. Rothman, London, England.

The invention has for its object a portable sawing machine, capable of being attached to a bench or any carrier, or on the piece to be cut itself, allowing to cut square or obliquely and to vary at will the pressure with which the saw is applied, according to the size of the piece and to the nature of the metal.



A method of carrying out the invention is illustrated, by way of example, in the accompanying drawing.

The inventor claims: In a machine for sawing metals, a circular saw, a rotating and sliding lever carrying said saw, an arm with a screw for securing the machine on a bench, another arm in a plane perpendicular to that of the first-named arm, and a screw in the second-named arm for clamping the piece to be cut.

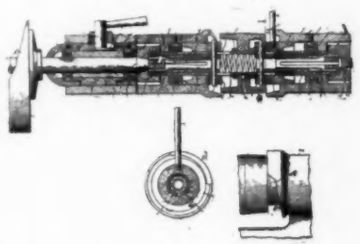
1,145,307. July 6, 1915. **Aluminum Solder.** J. F. Gross, Allentown, Pa.

This invention relates to a novel and improved solder composition for use in soldering pieces or parts of aluminum together, the object of the invention being to provide a soldering composition which is comparatively inexpensive, and by means of which aluminum parts may be quickly and solidly soldered together by the use of an ordinary soldering iron, and without the necessity of employing a blow-torch or a very high degree of heat.

In carrying out the invention there is provided a soldering composition consisting of the following elements, to wit: block tin, 80 parts; lead, 16 parts; aluminum, 8 parts; zinc, 16 parts, and phosphorus tin, 8 parts. These elements are fused or melted together in the usual manner and molded into bar or other desired shape, or the elements may be united with the parts to be joined at the time of making the union.

1,146,017. July 13, 1915. **Grinding and Polishing Machine.** W. F. O'Rourke, Chicago, Ill.

This invention relates to grinding and polishing machines or the like. In such machines it is customary to have polishing or grinding wheels secured upon opposite ends of a driving shaft, and the driving shaft is stopped, thereby stopping the operation of both wheels, whenever it becomes necessary to repair or render true either of said wheels.



The object of the invention is to provide a grinding or polishing machine in which, without stopping the rotation of the shaft, either wheel can be independently disengaged therefrom or thrown into engagement therewith, whereby one wheel can be stopped for repairs without disturbing the operation of the other.

The invention will be more fully understood by reference to the accompanying drawing.

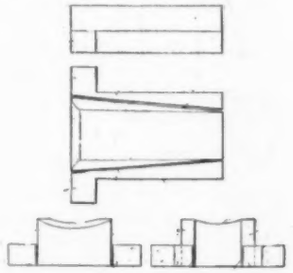
1,146,336. July 13, 1915. **Liquid Coating Composition for Preventing Metallic Surfaces from Tarnishing.** Charles Stewart Lounds, of Fort Lee, New Jersey.

This patent covers a mixture of substances designed as a covering to prevent tarnishing of metal surfaces, such as gold, silver, brass, copper, etc. The inventor claims:

The composition of matter, for preventing all kinds of plated silver, brass, copper, gold, silver, nickel, and all kinds of metal, from tarnishing, consisting of celluloid 1 ounce, amyl acetate 80 ounces, oil of cedar ½ ounce and denatured alcohol 1 ounce.

1,146,702. July 13, 1915. **Bearing Block or Brass.** A. H. Hardy and S. Davies, of Pontardawe, Swansea Valley.

This invention relates to improvements in bearing blocks and brasses and it refers more particularly to those of the kind in which the blocks or brasses are held in place between the bearing standards by means of wedges.



The present invention has for its object to provide a bearing of this kind suitable for use with heavy machinery such as rolling-mills and the like where it is frequently necessary to provide for their renewal.

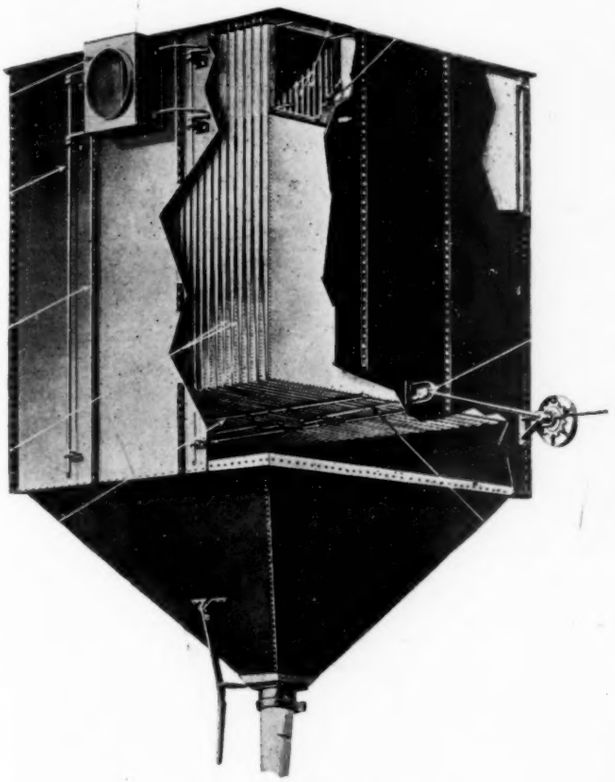
Now, according to the present invention, in order to reduce the weight of the bearing blocks and thereby cheapen their production, there is provided a longitudinally tapering block or brass, as shown in cut, with a pair of side wings or wedges of relatively cheap metal or material which are adapted to engage longitudinally between the sides of the said block and the vertical bearing standards of the machine.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

CLOTH-SCREEN DUST ARRESTER

The Whiting Foundry Equipment Company, Harvey, Ill., has recently placed on the market a very efficient cloth-screen dust arrester, shown in cut, which is designed for collecting dust from tumbling mills, emery wheels, sand blast equipment, etc. It consists of an outside case or house made of heavy



CLOTH SCREEN DUST ARRESTER.

sheet steel in which is located a series of cloth screens. These screens arrest all dust, permitting, however, the free passage of air. The arrester is guaranteed to take from the dust-laden air which passes through the arrester all the dust; the air coming from the arrester may be passed back into the shop perfectly clean.

THE CROLAC PROCESS

The Crolac Process is a new method for obtaining a beautiful deep black coating on steel and iron parts; very durable and rust resisting. By this process either a dead black or bright luster may be obtained, without subsequent buffing or other treatment.

It is said that screws, small stampings and other articles not readily Japanned can be perfectly finished without the threads or interstices becoming clogged; a complicated device can be processed without being taken apart.

Articles to be treated are dipped for a few seconds in a hot solution of "Crolac." An ordinary gas furnace may be used for this purpose. After the dipping the pieces are washed in hot water and dried in sawdust. The operation is easy, rapid, and economical, the main cost being the actual handling of the parts, and for this unskilled labor may be employed. "Crolac" lasts indefinitely. The solution may be used over and over again with practically no loss or depreciation.

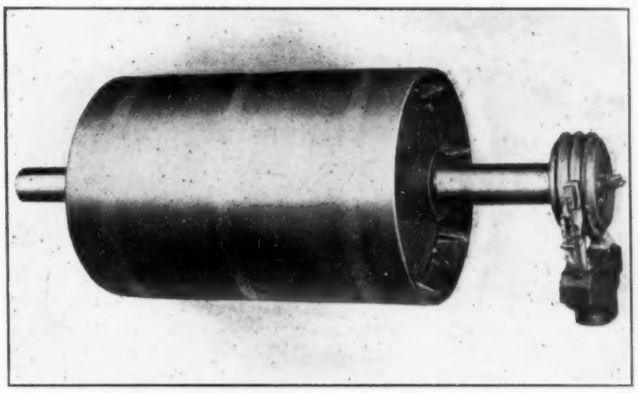
The Crolac Process, Inc., 34 Dorchester avenue, Boston, Mass., are now prepared to install the process and to grant licenses for its use. A demonstrating plant is maintained at Boston where prospective customers may see the work finished. Samples may be sent in and estimates will be furnished as to costs of process.

MAGNETIC SEPARATOR PULLEYS

The pulley shown in the cut has been designed to be used in a magnetic separator for the separation of iron from non-magnetic material. A very important use for such a machine is to be found in brass foundries, machine shops and metal recovery plants where the product to be treated is contaminated with iron or steel in the form of dust or chips.

It is not claimed by the manufacturers of these pulleys that they will meet any and all conditions and give a perfect separation, but it is said for them, however, that they are remarkably efficient in cases where they can be used and that they have a daily capacity far in excess of any other type of separator and which will do equally good work.

Construction—These pulleys consist of a number of steel discs keyed to a shaft, an electromagnetic winding being placed between alternate discs. The magnetizing coils are wound on steel bobbins, which are dowelled to the discs to prevent shifting. The coils are all connected in series and terminal wires brought through a hole in the center of the shaft to a pair of collector rings located far enough beyond the edge of the pulley to permit the location of a bearing between the collector rings and the pulley. The use of a steel bobbin secures all the advantages of the bobbin type



THE MAGNETIC SEPARATOR PULLEY.

construction without the disadvantage of reduced space efficiency which attends the use of a non-magnetic bobbin. All coils are impregnated with a moisture-repelling and insulating compound by vacuum process, which insures the removal of all moisture and the penetration of the impregnating compound to every part of the winding. The use of impregnated coils is very important, for the only separating pulleys manufactured by us that have ever given trouble are those built before the adoption of the present impregnating process.

For further information relating to these pulleys address the Cutler-Hammer Manufacturing Company, New York, and ask for Bulletin 13,000.

film of lead or alloys thereof may be successfully and tenaciously applied to surfaces of iron.

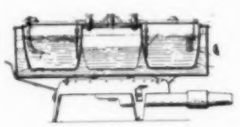
The patent covers: A process of the nature disclosed for lead-coating iron surfaces, consisting in initially obtaining a clean iron surface, and then contacting the same with a fused lead-bearing bath in the presence of metallic cadmium.

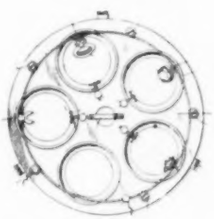
1,144,226. June 22, 1915. **Electro-Plating Process.** C. B. Mills, Baltimore, Md.

This invention covers a process of electro-plating cement, glass, plaster of Paris, wood and other non-metallic substances. The principal claim is for the composition of the bath in which the article is boiled before it is plated. The inventor claims: The process of electro-plating non-metallic substances, which consists in first treating the article with a moisture and acid-proof filling and coating solution of asphaltum, methylated spirits, stearic acid and glycerine, then applying a sizing coating, then applying an adhesive ground coating of litharge, asphaltum, methylated spirits and a suitable gum resin, then applying a powdered conducting material, and finally electro-plating the surface thus prepared.

1,144,680. June 29, 1915. **Electro-Plating Apparatus.** H. S. Allers, Buffalo, N. Y.

This invention relates to an electro-plating apparatus which is more particularly designed for use by jewelers for the purpose of electro-plating articles which have been repaired by the use of solder or otherwise and require a thin coating of metal, corresponding to the main part of the jewelry, to be deposited over the solder joints and other parts preparatory to polishing and finishing the job suitable for handling over to the customer.

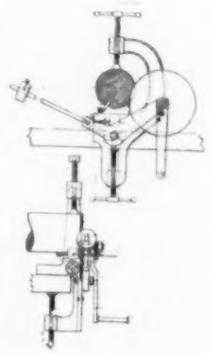




It is the object of this invention to produce an apparatus, as shown in cut, for this purpose which is comparatively simple and inexpensive in construction, which can be operated at low cost, which enables the jeweler to produce at a minimum cost electro-plating solutions of various metals and colors of metals preparatory to performing the actual electro-plating operation, and which enables a jeweler to electro-plate different jobs with different kinds and colors of metal at the same time in his own establishment without necessitating sending the same out to another plating works for this purpose.

1,144,867. June 29, 1915. **Machine for Sawing Metals.** E O. Rothman, London, England.

The invention has for its object a portable sawing machine, capable of being attached to a bench or any carrier, or on the piece to be cut itself, allowing to cut square or obliquely and to vary at will the pressure with which the saw is applied, according to the size of the piece and to the nature of the metal.



A method of carrying out the invention is illustrated, by way of example, in the accompanying drawing.

The inventor claims: In a machine for sawing metals, a circular saw, a rotating and sliding lever carrying said saw, an arm with a screw for securing the machine on a bench, another arm in a plane perpendicular to that of the first-named arm, and a screw in the second-named arm for clamping the piece to be cut.

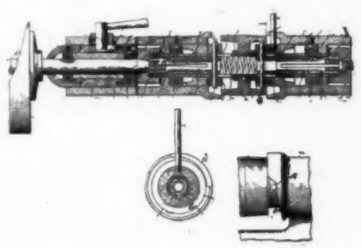
1,145,307. July 6, 1915. **Aluminum Solder.** J. F. Gross, Allentown, Pa.

This invention relates to a novel and improved solder composition for use in soldering pieces or parts of aluminum together, the object of the invention being to provide a soldering composition which is comparatively inexpensive, and by means of which aluminum parts may be quickly and solidly soldered together by the use of an ordinary soldering iron, and without the necessity of employing a blow-torch or a very high degree of heat.

In carrying out the invention there is provided a soldering composition consisting of the following elements, to wit: block tin, 80 parts; lead, 16 parts; aluminum, 8 parts; zinc, 16 parts, and phosphorus tin, 8 parts. These elements are fused or melted together in the usual manner and molded into bar or other desired shape, or the elements may be united with the parts to be joined at the time of making the union.

1,146,017. July 13, 1915. **Grinding and Polishing Machine.** W. F. O'Rourke, Chicago, Ill.

This invention relates to grinding and polishing machines or the like. In such machines it is customary to have polishing or grinding wheels secured upon opposite ends of a driving shaft, and the driving shaft is stopped, thereby stopping the operation of both wheels, whenever it becomes necessary to repair or render true either of said wheels.



The object of the invention is to provide a grinding or polishing machine in which, without stopping the rotation of the shaft, either wheel can be independently disengaged therefrom or thrown into engagement therewith, whereby one wheel can be stopped for repairs without disturbing the operation of the other.

The invention will be more fully understood by reference to the accompanying drawing.

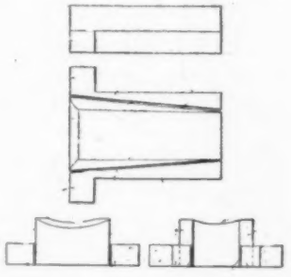
1,146,336. July 13, 1915. **Liquid Coating Composition for Preventing Metallic Surfaces from Tarnishing.** Charles Stewart Lounds, of Fort Lee, New Jersey.

This patent covers a mixture of substances designed as a covering to prevent tarnishing of metal surfaces, such as gold, silver, brass, copper, etc. The inventor claims:

The composition of matter, for preventing all kinds of plated silver, brass, copper, gold, silver, nickel, and all kinds of metal, from tarnishing, consisting of celluloid 1 ounce, amyl acetate 80 ounces, oil of cedar ½ ounce and denatured alcohol 1 ounce.

1,146,702. July 13, 1915. **Bearing Block or Brass.** A. H. Hardy and S. Davies, of Pontardawe, Swansea Valley.

This invention relates to improvements in bearing blocks and brasses and it refers more particularly to those of the kind in which the blocks or brasses are held in place between the bearing standards by means of wedges.



The present invention has for its object to provide a bearing of this kind suitable for use with heavy machinery such as rolling-mills and the like where it is frequently necessary to provide for their renewal.

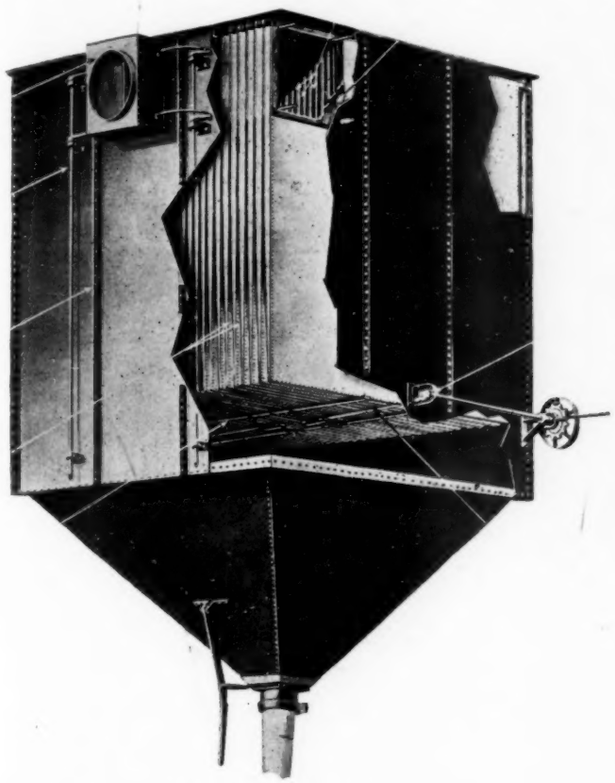
Now, according to the present invention, in order to reduce the weight of the bearing blocks and thereby cheapen their production, there is provided a longitudinally tapering block or brass, as shown in cut, with a pair of side wings or wedges of relatively cheap metal or material which are adapted to engage longitudinally between the sides of the said block and the vertical bearing standards of the machine.

EQUIPMENT

NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

CLOTH-SCREEN DUST ARRESTER

The Whiting Foundry Equipment Company, Harvey, Ill., has recently placed on the market a very efficient cloth-screen dust arrester, shown in cut, which is designed for collecting dust from tumbling mills, emery wheels, sand blast equipment, etc. It consists of an outside case or house made of heavy



CLOTH SCREEN DUST ARRESTER.

sheet steel in which is located a series of cloth screens. These screens arrest all dust, permitting, however, the free passage of air. The arrester is guaranteed to take from the dust-laden air which passes through the arrester all the dust; the air coming from the arrester may be passed back into the shop perfectly clean.

THE CROLAC PROCESS

The Crolac Process is a new method for obtaining a beautiful deep black coating on steel and iron parts; very durable and rust resisting. By this process either a dead black or bright luster may be obtained, without subsequent buffing or other treatment.

It is said that screws, small stampings and other articles not readily Japanned can be perfectly finished without the threads or interstices becoming clogged; a complicated device can be processed without being taken apart.

Articles to be treated are dipped for a few seconds in a hot solution of "Crolac." An ordinary gas furnace may be used for this purpose. After the dipping the pieces are washed in hot water and dried in sawdust. The operation is easy, rapid, and economical, the main cost being the actual handling of the parts, and for this unskilled labor may be employed. "Crolac" lasts indefinitely. The solution may be used over and over again with practically no loss or depreciation.

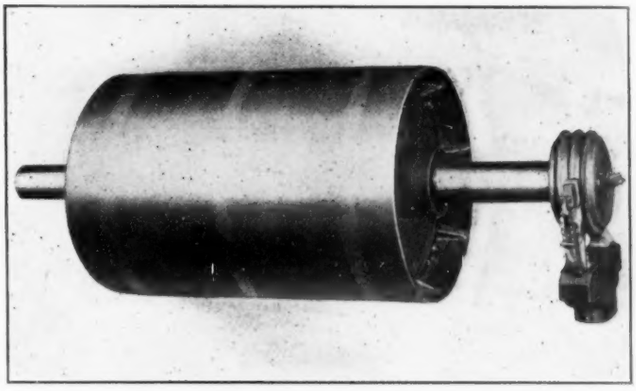
The Crolac Process, Inc., 34 Dorchester avenue, Boston, Mass., are now prepared to install the process and to grant licenses for its use. A demonstrating plant is maintained at Boston where prospective customers may see the work finished. Samples may be sent in and estimates will be furnished as to costs of process.

MAGNETIC SEPARATOR PULLEYS

The pulley shown in the cut has been designed to be used in a magnetic separator for the separation of iron from non-magnetic material. A very important use for such a machine is to be found in brass foundries, machine shops and metal recovery plants where the product to be treated is contaminated with iron or steel in the form of dust or chips.

It is not claimed by the manufacturers of these pulleys that they will meet any and all conditions and give a perfect separation, but it is said for them, however, that they are remarkably efficient in cases where they can be used and that they have a daily capacity far in excess of any other type of separator and which will do equally good work.

Construction—These pulleys consist of a number of steel discs keyed to a shaft, an electromagnetic winding being placed between alternate discs. The magnetizing coils are wound on steel bobbins, which are dowelled to the discs to prevent shifting. The coils are all connected in series and terminal wires brought through a hole in the center of the shaft to a pair of collector rings located far enough beyond the edge of the pulley to permit the location of a bearing between the collector rings and the pulley. The use of a steel bobbin secures all the advantages of the bobbin type



THE MAGNETIC SEPARATOR PULLEY.

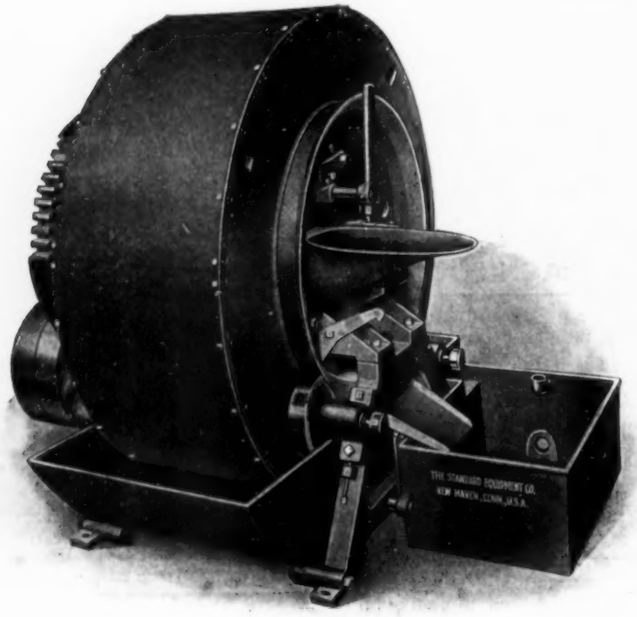
construction without the disadvantage of reduced space efficiency which attends the use of a non-magnetic bobbin. All coils are impregnated with a moisture-repelling and insulating compound by vacuum process, which insures the removal of all moisture and the penetration of the impregnating compound to every part of the winding. The use of impregnated coils is very important, for the only separating pulleys manufactured by us that have ever given trouble are those built before the adoption of the present impregnating process.

For further information relating to these pulleys address the Cutler-Hammer Manufacturing Company, New York, and ask for Bulletin 13,000.

STANDARD CINDER CRUSHERS

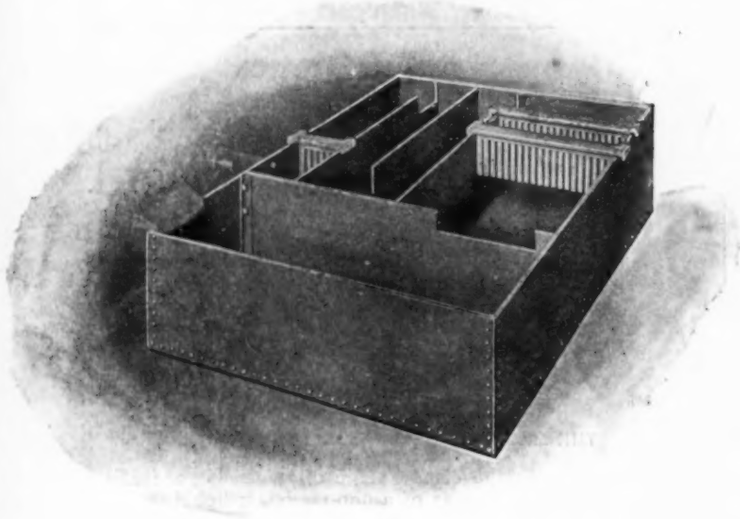
The machinery shown in the accompanying illustrations comprises an equipment of the Standard cinder crushing mill which is designed for use in the recovery of metals from cinders or other materials which require to be reduced in size before metallic products can be separated from the gang.

This crushing mill and pulverizer has been invented by



STANDARD CINDER CRUSHING MILL WITH HOPPER IN POSITION FOR FEEDING.

Charles A. Dreisbach and a number of important improvements are embodied in the complete outfit. One of the most important of these is the claim made by the manufacturers

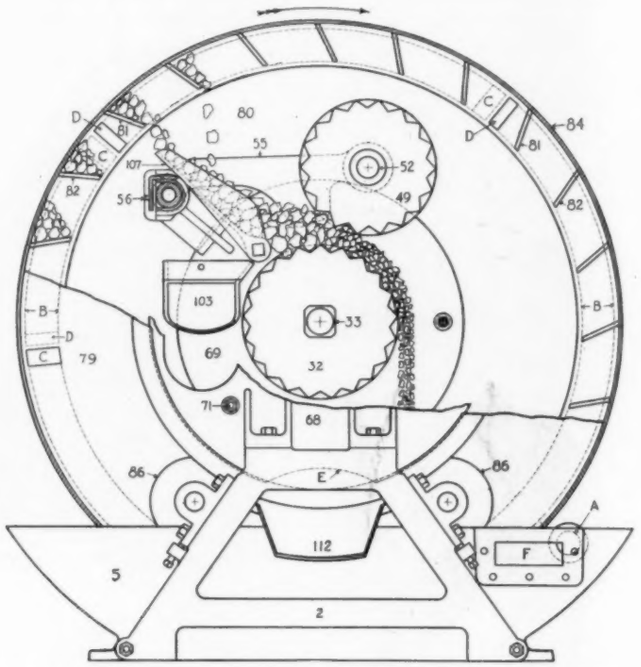


STANDARD SETTLING TANK.

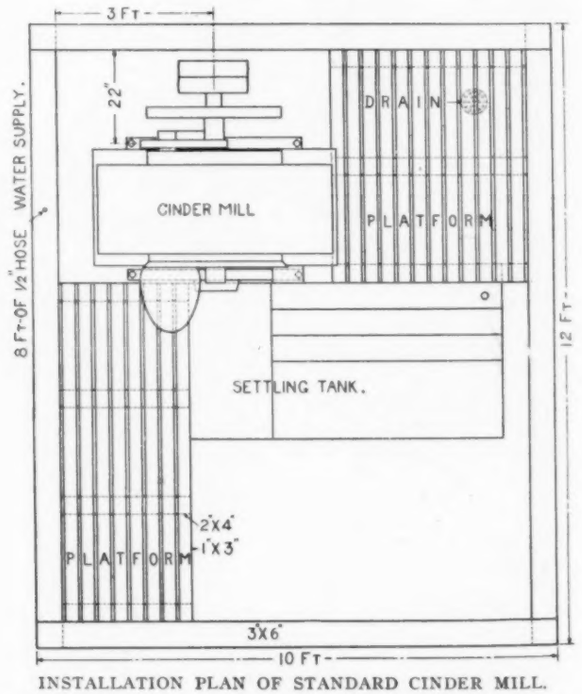
as to the amount of power required for the operation of the mill. It is said that the machine will run either wet or dry, takes only three horsepower, compared with fifteen to twenty used by other makes.

In the matter of the use of water the new machine is claimed to be most economical, as it will operate on the same water without being refilled after it has been started with its initial load of about two hundred gallons. This means a saving of a number of thousands of gallons of water per year. The mill may also be operated dry, but this is not recommended by the manufacturers.

The Standard mill is reported to be a continual producer and will crush and separate metal from cinders as fast as they can be shoveled into the hopper. There is no additional labor



FRONT VIEW STANDARD CINDER CRUSHING MILL, HAVING FRONT RING AND HEAD CUT AWAY TO SHOW ARRANGEMENT OF CRUSHING ROLLS, BUCKETS, ETC.



INSTALLATION PLAN OF STANDARD CINDER MILL.

needed after the material has been through the mill once, no sifting, washing or separating is required. The machine will handle about 1,000 pounds of cinders per hour. As to the actual saving made by this machine in metal analysis shows

the amount, even in the tailings, to be less than 1 per cent., which is said to be one-half that left by other methods.

A complete description of the construction and operation of this outfit is contained in a catalog which may be obtained from the manufacturers, The Standard Equipment Company, New Haven, Conn.

VERTICAL TYPE OILER

To meet the demand for an oiler embodying the same principal as their Universal type, the Hanna Engineering Works, 2059 Elston avenue, Chicago, have developed the vertical type shown in the accompanying illustration. The operation of the Hanna Suction Oiler is entirely automatic because suction action takes place the instant the air moves and ceases the instant the air is shut off. It ensures the right amount of lubricant at the proper place and at the proper time. A chamber containing an absorbent is kept saturated from another large oil storage chamber surrounding it. Air passing through the lubricator becomes sufficiently charged with oil to properly lubricate all surfaces with which it subsequently comes in contact.

HANNA SUCTION OILER.

The Universal type can be attached to air line in any position and operates equally well in any plane or angle and can be filled no matter what position it is in. The vertical type can be used only when upright. This inexpensive device, it is said, will prolong the life of pneumatic equipment, increase efficiency and reduce maintenance costs.

Made with ¾ inch, 1 inch and 1½ inch pipe connections.

EXHIBITS AT THE SAN FRANCISCO EXHIBITION

CARBORUNDUM COMPANY

The illustration shows the comprehensive way that this company treated their exhibit.

In brief, the plan of the exhibit is to show the varied uses to which carborundum products are put, to show the wide variety of materials and products in their crude or unfinished state and after they had been cut, ground or finished with carborundum products. The result has been a wonderful collection gathered from manufacturing plants, not only in this country, but from South America, England, India, New Zealand, Australia and other foreign countries. The collection embraces materials and products ranging from tooth picks to flooring, from flour mill rolls to needles, from steel shafts to watch dials, from semi-precious stones to shrapnel shells and malleable castings, and also includes samples of marble, onyx and granite, pearl, cut and engraved glass, sueded skins and boots and shoes. In the grinding, shaping and finishing of every piece of the show, carborundum products have played their important part, and in each case the particular carborundum products which did the work is shown.

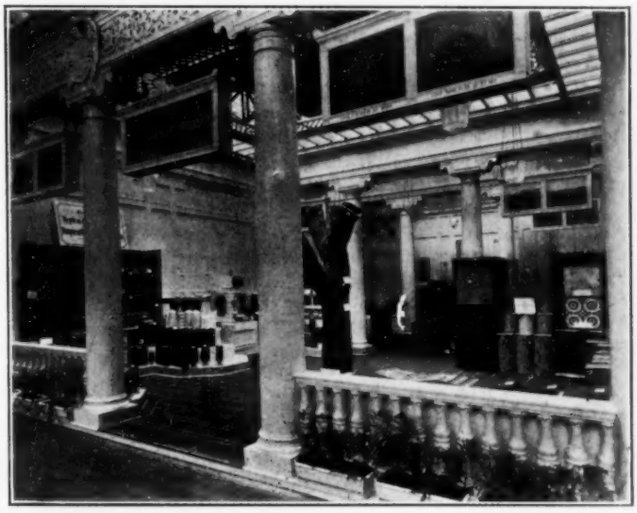
To display the hundreds of products, a space of about 1,400 square feet was necessary. The materials are shown in full glass show cases. In the center of the exhibit is a fountain, built of irregular masses of iridescent carborundum crystals, over which real water plays, splashing into a marble basin, the coping for which was molded with carborundum wheels. The fountain is twelve feet high and is strikingly beautiful.

THE CARBORUNDUM COMPANY'S EXHIBIT AT SAN FRANCISCO, CAL.

ARMSTRONG CORK COMPANY

The exhibit of the Armstrong Cork Company and the Armstrong Cork and Insulation Company, of Pittsburgh, Pa., is particularly interesting due to the exhibit of heat-insulating materials. All of these articles exhibited, except one, are by-products of cork—manufactured either solely, or in part, from cork waste. The one exception is "nonpareil"* high-pressure covering for steam lines and other heated surfaces, which is composed of diatomaceous earth (kieselguhr) and asbestos.

The exhibit of nonpareil insulating brick, which adjoins that of cork covering, is an unusual demonstration of how modern science produces new articles by combining two or more substances long well known. These insulating brick—so light that they float on water—are composed of diatomaceous earth mixed with ground cork, molded into brick form and then fired. The cork is burned out entirely, leaving the brick extremely porous in texture and a light terra cotta in color. A series of nine models, complete in every detail, show how the brick are installed in boiler settings, bread baking ovens, heat treating furnaces, hot blast mains, brick kilns, etc.



ARMSTRONG CORK COMPANY'S BOOTH AT SAN FRANCISCO, CAL.

*Described in THE METAL INDUSTRY, September, 1914.

ASSOCIATIONS AND SOCIETIES

REPORTS OF THE CURRENT PROCEEDINGS OF THE METAL INDUSTRY ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS

President, G. H. Clamer, Philadelphia, Pa. Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held September 27 to October 1, at Atlantic City, N. J.

Secretary Corse reports that the programme for the convention at Atlantic City, N. J., September 28 to October 1, 1915 is as follows:

Monday, September 27,—Registration, Young's Pier.

Monday Evening, September 27.—Informal dance, Young's Pier.

Tuesday, September 28, 10 a. m.—Convention Hall, Young's Pier, joint meeting of the American Foundrymen's Association and the American Institute of Metals.

Tuesday, September 28, 2:30 p. m.—Meeting of the Institute of Metals, Hotel Traymore.

Tuesday, September 28, 8 p. m.—Theatre party for members of the American Foundrymen's Association and the American Institute of Metals.

Wednesday, September 29, 10 a. m.—Meeting of the American Institute of Metals, Hotel Traymore.

Wednesday, September 29, 2:30 p. m.—Meeting of the American Institute of Metals, Hotel Traymore.

Wednesday, September 29, 8 p. m.—Annual meeting of the American Institute of Metals, Solarium, Hotel Traymore.

Thursday, September 30, 10 a. m. and 2:30 p. m.—Meeting of the American Institute of Metals, Hotel Traymore.

Friday, October 1, at 10 a. m.—Final business session, American Institute of Metals, Hotel Traymore.

Mr. Corse adds: "It looks very much as though we would have a very good convention, particularly in view of the splendid series of papers* that are to be presented. Atlantic City is such a splendid convention place that it ought to attract a large number of people."

The proposed changes in the constitution as published in the June issue of THE METAL INDUSTRY have been adopted by a vote of the members of the Institute.

The substance of these changes is the changing of the dues from five to ten dollars; the creation of a Corporation Membership, which can be taken advantage of by those concerns who wish to lend their financial support to the Institute and can do so by taking out a Corporation Membership, thus giving their various representatives a little lower rate per head when the number is three or more, than by taking out a straight membership. The new arrangement will also enable foremen and other members who do not wish to secure the bound volume of Transactions to get all the benefits of meetings and the advance copies of the papers at the same rate as at the present time. It is earnestly to be hoped that many of the corporations will avail themselves of the Corporation Membership privilege, but in case they decide not to, the Institute will be very glad to continue the membership of some individual in their company as their representative at the Active Membership rate of ten dollars.

*Published in the July issue of THE METAL INDUSTRY.

FOUNDRY AND MACHINE EXHIBITION COMPANY

The Exhibition Quarterly, which is the official organ of the Foundry and Machine Exhibition Company, in its July issue has the following to say about the tenth exhibit which will be held at Atlantic City, N. J., September 25 to October 1, 1915. (The exhibition will be held at Young's Million-Dollar Pier, which was illustrated in the January issue of THE METAL INDUSTRY.

"Location has always a marked influence on attendance, and exhibitors this year, for the first time since 1907, will have the opportunity to show their lines to the thousands of local buyers from Philadelphia, Baltimore, Wilmington, Newark, New York and New England, as well as the hundreds of industrial cities and towns in the territory named. To these will be added a host of foreign buyers who will come to America for the double purpose of visiting the exhibition and the great expositions on the Pacific Coast. And on top of the local and foreign visitors we can promise a more representative attendance from the whole country than could be induced to travel to any less enticing a place than Atlantic City. So a record-breaking attendance of real buyers is practically assured in advance."

AMERICAN ELECTRO-PLATERS' SOCIETY

(AN EDUCATIONAL SOCIETY.)

President, W. S. Barrows, Toronto, Canada; Secretary-Treasurer, Walter Fraine, 507 Grand Ave., Dayton, Ohio. All Correspondence should be addressed to the Secretary. The objects of this society are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. The Society meets in convention in the spring of each year, subject to the decision of the executive committee. The next convention will be held at Toronto, Canada. The branch associations hold monthly and semi-monthly meetings in their various cities.

New York Branch.—H. H. Reama, president, and William Fischer, secretary, 345 East 23rd street, New York, N. Y.

The regular monthly meeting of this branch was held Friday, July 23. After the regular order of business Professor Joseph W. Richards, of Lehigh University, South Bethlehem, Pa., gave an interesting talk on the progress made in electrochemical analysis, describing various processes. The next meeting of this branch will be held Friday, August 27, at 258 Pearl street, New York.

Rochester Branch.—C. V. Haring, secretary, 603 Dewey avenue, Rochester, N. Y.

During the summer this branch has been holding its meetings at the Osborne House, but will resume its regular work at the University of Rochester in September. The branch expects to hold a banquet some time in September in order to give platers who are not members an opportunity to become acquainted with the association and inspect the display of plating and finishes accomplished by the members of the branch. The next meeting will be held September 13, when several speakers will address the branch on the various topics which the platers are interested in.

Cleveland Branch reported through its secretary, Charles Werft, 331 Strathmore avenue, Cleveland, Ohio, under date of July 24, that it would hold its meeting on July 31. At this meeting they expected to have a talk by Mr. Charles H. Proctor on metal cyanides and F. J. Burkhart was to read a paper on the plating of casket hardware. Plans are under way for laboratory equipment and a new society room.

Toronto Branch, W. J. Salmon, president, and Ernest Coles, P. O. Box 5, Coleman, Ont., Canada, secretary.

This branch held its regular meeting on Thursday, July 22, at which time the following officers elected at the last meeting were installed for the coming year: William J. Salmon, president; John Acheson, vice-president; Ernest Coles, secretary-treasurer; J. A. Magill, librarian, and W. W. Wells, Jr., T. Charles Orr and W. S. Barrows, trustees.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

Commissioner Webster reports that at the recent meeting at Niagara Falls, N. Y., little transpired that the association would care to have made public through the medium of the public press.

They agreed to discontinue the practice of stamping other than the association name on goods shown in the official catalog, believing that it is a matter of advertising entirely due to the manufacturer and, furthermore, that it is a mark of identification which in itself stands for protection to the maker. They also reaffirmed the time honored custom of allowing cash discount of 2 per cent. ten days from date of invoice.

Reports indicated that the plants were running 84.52 per cent. average as against their normal capacity and while some reported that they were not up to standard insofar as business is concerned, generally speaking, the pulse of the meeting was good, with a better feeling and a higher tendency.

The meeting adjourned to meet in Cleveland, Ohio, September 15 and 16.

EXHIBITION OF CHEMICAL INDUSTRIES

Arrangements for the National Exposition of Chemical Industries to be held in New York at the Grand Central Palace the week of September 20 are progressing very favorably and over fifty per cent. of the entire main floor space has been reserved by manufacturers throughout the country.

Among the exhibitors there will be many who will have working exhibits, exhibits that will be unusually attractive. Many new things that were to have had their inception in the near future will make their debut before the visitors at this exposition.

An auditorium will be provided with arrangements for motion and slide pictures for special features. Motion pictures of industrial and commercial plants will be shown and various processes in operation; these will appeal to the technologist and be of educational value to the general public. Lectures will be given in this auditorium by men of prominence in the chemical industries. Some of these lectures will be illustrated by stereopticon and moving pictures.

Meetings of the chemical, chemical engineering and engineering societies are being arranged. The meetings of the American Electrochemical Society, New York Section, which has been fixed for Tuesday, September 21, promises to be an exceptional meeting.

Everyone directly interested in chemical industries is requested to send in notice at once of their intention to be in New York for this exposition. Upon receipt of same, the management will furnish without charge a season pass to be used as often as they choose during their stay in New York.

The exposition has been organized by Messrs. Nagelvoort and Roth, with executive offices at the Grand Central Palace, 46th street and Lexington avenue, New York (telephone Murray Hill 6990), with the co-operation of the International Exposition Company, who have promoted very many successful expositions in the past. For further information address the above.

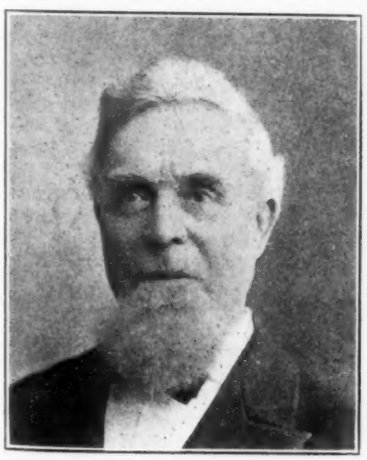
PERSONALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

DEATHS

ANDREW ALLAN, SR.

Andrew Allan, Sr., notice of whose death was recorded in THE METAL INDUSTRY for July, was born at Edinburgh, Scotland, March 10, 1837. Mr. Allan, who was the founder of the firm of A. Allan and Son, New York, N. Y., who manufacture "Allan Metal" brand bearing alloys, retired from active business in 1909, but continued to act in an advisory capacity until his death.



ANDREW ALLAN, SR.

Andrew Allan, Sr., served his apprenticeship in the brass foundry and finishing shops at the Laidlaw Works, Edinburgh, Scotland. He came to the United States in the year 1857, and was employed as a brass molder in the Mitchell Vance and H. R. Worthington plants. In 1865 he was placed in charge of the H. F. Johnston's Brass Works, New York City, which position he held until 1891, when the firm retired from business. He founded the firm of A. Allan and Son in the year 1891 to manufacture the "Allan Metal" brand of bearing alloys.

His most noteworthy metallurgical accomplishment was his discovery of the possibility of introducing high percentages of lead in copper base bearing alloys and the advantages derived thereby. In 1876 he invented the process of alloying lead and copper in any desired proportion, with or without tin, and was the first to put such alloys on the market.

At the time of his death he was in apparent good health. He was an expert swimmer and even at his advanced age could hold his own with men half his years. On July 6 he went into the surf for his first swim of the season. He staid in about twenty minutes and returned to his bath house and while dressing passed away.

He is survived by his wife, three sons and two daughters.

William Briggs, a manufacturer of brass goods and plumbers' supplies, with a factory at 100 Lexington avenue, Brooklyn, N. Y., for many years, recently died at his home at 1053 Bedford avenue. Mr. Briggs was 67 years old.

George Nicholson, treasurer of the Nicholson File Company, Providence, R. I., died July 16 at his home, 181 Adelaide avenue, that city. Mr. Nicholson was 72 years old and is survived by his wife.

As we go to press we learn of the death of J. L. Mott, of the J. L. Mott Company, New York.

TRADE NEWS

BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS AND TRADE ITEMS OF INTEREST FROM THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

August 2, 1915.

Although there has been some speculation as to whether there would be any labor disturbances hereabouts on account of the strike of machinists in Bridgeport at the plant of the Remington Arms Company, up to date there has been no evidence of strike fever among Naugatuck Valley workingmen. Waterbury had a touch of the fever and was cured, four or five months ago, and since that time there has been no great encouragement offered to agitators. It is not considered likely that there will be any trouble here in the manufacturing industries because there has been a readjustment of wages recently in most plants. The men are satisfied and conditions are not such, despite the rush of war orders to a few shops, as to deceive sensible workingmen as to the possibility of real success in undertaking a strike.

There was a flurry of trouble in several departments of the larger Naugatuck Valley metal industries during the past year, but the last of these were cleared up and amicable understandings reached between men and employers not less than about four months ago. Torrington, Ansonia, Waterbury all experienced some of this trouble, a large portion of which seemed to originate in the casting departments of brass plants, but in no case was it more than one or two days old before there was an adjustment which restored peace wholly. At the plants of the American Brass Company there was a slight readjustment of terms and wages and in the other plants of the city the employers were careful to investigate any causes for complaint which appeared and to eliminate them not because of fear of labor union agitators, but because they realized that the demands on their industrials were growing so rapidly that the utmost efficiency was necessary and a minimum of friction between foremen and employees essential. There was some effort made about six months ago to organize the machinists of Waterbury shops and a fragile membership was created, but there has been no evidence of union activity as a result of the campaign.

Industrial conditions here continue much as they have been for the past six months. Normal business still is aggravatingly low, but there is noticeable the general month-to-month improvement which was reported in these columns a few months ago and which was predicted as more than a temporary condition. One may wonder why the smaller industries have not been more generally and more markedly benefitted as a result of the rush in the larger plants, causing the refusal of orders of great proportions. The answer is that the condition of domestic business is still subnormal and while it has been improving the effect has been merely to move finished products already in the market instead of to create sufficient activity to warrant large orders for new goods.

The American Brass Company, the Scovill Manufacturing Company, the Chase Rolling Mills Company, the three largest and best equipped brass and copper manufacturers in the country, have been obliged to turn down orders for millions of pounds of brass because of the press of other orders and the fact that the goods refused were desired within a certain period. It is the policy of the Waterbury manufacturers to take care of their regular customers as well as they can and the American Brass Company especially has insisted on this policy being strictly adhered to, but despite this fact, there have been numerous large orders turned down by the American Brass. It is possible that some of these orders are the result of the high prices of copper and spelter and a mild panic among brass users that the continuance of the war will simply force the prices higher and higher.

Oddly enough there have been comparatively few of the orders turned down by the large corporations offered to smaller concerns which might handle them, with the proper specifications. There is evidence of more scientific ordering, however, and it will not be surprising if the smaller plants find themselves forced to speed up in the near future. Novelty business is good, from the optimists's point of view, and plants all are running at six days a week, but there is no boom.

At the new plant of the Scovill Manufacturing Company work is rapidly advancing and the steel framework of a new mill seems to be completed each week, while less substantial structures are suddenly taking their places on the spacious new area which the company is utilizing day after day. One must be impressed when he sees the thousands of men and women pouring out of the plant at noon and at night, actually flooding the streets in its immediate vicinity, while other thousands of men, at night, are lined up at the gates ready to pass in and take their places in the all-night crews. War makes work as well as debt.—F. F. B.

BRIDGEPORT, CONN.

August 2, 1915.

Bridgeport has been established as a non-strike community throughout the world as a result of the big fizzle in all attempts to induce labor dissension that would eventuate strikes here within the past month. The workmen seemed satisfied entirely with conditions as they existed and as they were being bettered continually and were less than lukewarm on any strike propositions. Efforts to get labor wrought up enough to induce a successful strike are still being extended by leaders who have hopes of achieving triumph, but unless prevailing opinion changes radically the Park City, Connecticut's industrial capital, will never suffer any great labor depression.

The labor leaders who fathered the troubles at the Remington Arms and Ammunition Company do not yet agree with the sentiment which called their initiation a fiasco. They claim to have gained everything they sought. It is true that an eight-hour day was granted and will go into effect on this morning, and while the labor leaders believe or claim to the opinion that their work brought this about, the factory heads asservate that they had this under consideration before the difficulties and proposed to give the workmen this schedule on August 1. Structural iron workers who were out, machinists who went out on the call in small proportions, and millwrights are all back at work putting in at least a full day and some getting overtime.

Because of the fact that there are not adequate housing conditions here in which the flocks of workmen coming to the arms and ammunition concerns may dwell, the Remington Arms Company has underatken to purchase property and erect homes to cost upwards of $500,000. These will be of two stories in height and of fireproof construction and each one will possess its own features of individuality and distinctiveness. The concern will go to all expense in the initial effort, but will permit the employees later to purchase these homes, considering the rent as part payment. This has brought considerable joy to the hearts of those who thought the influx might be of a temporary nature, inasmuch as this would indicate permanency of residence in Bridgeport on the part of those taking up dwelling in these houses. So glad were the tidings on the reception by the general public that Mayor C. B. Wilson in an interview lauded the officials of the company for their highly developed co-operative spirit.

Meantime Bridgeport is looking up in many ways. The board of aldermen are considering numerous building regulations that the constructive work may result as a future benefit rather than a detriment. The population is increasing steadily, families coming here as rapidly as they can locate a place to abide. General contractors are feeling the benefits of the quantity of outside capital interested in building and merchants of the general trades are feeling the prosperity wave which is sweeping over the municipality.—E. C. D.

NEW BRITAIN, CONN.

AUGUST 2, 1915.

Business conditions in New Britain's metal manufacturing lines have been generally brisk during the past month and the present outlook is that the coming month will be equally prosperous and the fall season will witness a business revival exactly opposite the depression suffered here a year ago.

At the North & Judd Manufacturing Company, which concern is literally swamped with war orders from the British government, it has been impossible to take the annual July inventory of stock and equipment this year and even while one part of a factory building is being razed to make room for a larger addition, the machines at the other end of the building are buzzing night and day turning out products, so rushed is the business. New Britain's biggest concern, the American Hardware Corporation, is doing a good volume of business in all its departments, and Manager Charles Glover, of the Corbin Screw division, is jubilant over what he terms a "great rush." Manager Charles Parsons, of the P. & F. Corbin division, says his plant has a good average business and is keeping much the same as it has been. The Corbin Cabinet Lock division manager, Carlisle H. Baldwin, says his business is not particularly rushed, but is just about average. The Russell & Erwin division also has a good business at present.

President Alex W. Stanley, of the Stanley Rule & Level Company, reports his business as quiet and when reminded of the activities at other plants he said: "They're lucky, we're not." However, this concern is one of New Britain's busiest concerns and the lull is due to the war affecting the export trade. The Skinner Chuck Company is very busy and the Hart & Cooley Company has a good average business, while Treasurer Guy Hutchinson, of the Hart & Hutchinson Company, says his business is beginning to pick up in good shape. The New Britain Machine Company is rushed with semi-war orders. While this plant makes no munitions of war, it does make a special machine which is used extensively in making war materials, particularly parts of shrapnel, and it is because of the activities of ammunition factories in other parts of the country that the local concern is kept busy supplying them with the necessary machinery. Superintendent J. F. Lamb, of Landers, Frary & Clark, reports business conditions as normal, while General Manager E. G. Hurlburt, of the Vulcan Iron Works, speaks very optimistically of business conditions at his foundry. Assistant Secretary C. S. Neumann, of the Union Works, also has an encouraging word to say about business at his factory and expects the new factory addition to be completed in a few months. It is admitted at the Traut & Hine Manufacturing Company that large war orders have been received and the officials confess that they anticipate more.

Vice-president E. Allen Moore, of the Stanley Works, says business is good. It is well known that the Stanley Works has been keeping busier than most of the factories during the entire period of hard times and some of the departments are rushed with orders.

While Bridgeport has been troubled with machinists' strikes, this city has been remarkably free from such affliction. Some weeks ago a professional organizer came here and tried to organize a machinists' union. He held several meetings and is still holding them, but his attendance is generally about a dozen, while the factory interests look upon his punative attempts to "start something" with a skeptical smile.—H. R. J.

HARTFORD, CONN.

AUGUST 2, 1915.

Because of enormous war orders, Colt's Patent Fire Arms Manufacturing Company, of Hartford, found itself obliged to oust the tenants of the historic old West Armory on Huyshope avenue in order to double the output of its plant. The change is important to metal trades, not only because of the great increase in work of the Colt plant, but also because the other concerns which are obliged to move are also engaged in metal working.

The four concerns which must seek new quarters are the Maxim Silencer Company, the Hartford Automobile Parts Company, the Asa S. Cook Company and the Sterling Blower Company. News of the change was a surprise to all, and while it had been realized that the Colt company's business had gained immensely since the beginning of the war, it was not generally known that the plant was incapable of caring for it. It had been thought by many that a new building on the grounds would be erected, but Colt officials believed that it would be more practicable to make use of the old west armory.

A deal was consummated Saturday, July 10, for the purchase of the old Hartford Foundry Corporation plant at the corner of Windsor and Suffield streets by the Sterling Blower Company, which is one of the four tenants asked to vacate Colt's West Armory. About $15,000 will be spent in renovating the plant; concrete floors, covered with wood, will be laid, the entire interior repainted and exterior repairs made. It will be ready for occupancy probably September 1. The company will employ 100 men in the factory, in addition to 100 others on the road installing blower systems. At present the total number of employees is about 100. George W. Christoff is president and treasurer of the concern and Robert H. Briggs is general manager.

The purchase includes a lot, 550 by 150 feet, and the one-story brick foundry building, whose main part is 300 feet long and sixty feet wide, in addition to a 60-foot ell on Suffield street. On the Suffield street side the building is two stories high. This section will be used by the Sterling Blower Company as its office. The plant abuts on property of the New York, New Haven & Hartford Railroad and has a private siding. The building is practically vacant at present, so there is nothing to hinder the speedy completion of the renovation work.—T. J. W.

PROVIDENCE, R. I.

AUGUST 2, 1915.

The metal trades not only of this city, but throughout the state, are, as has been the case for a number of months, the leaders among the local industries. The shops and factories that are turning out machinery, war material, machinery parts and supplies of all kinds are being rushed to the limit, and it is reported that there appears to be no let-up in sight. It is said that when the contracts upon which a plant is engaged are nearing completion other advantageous contracts are always ready for the management, either from abroad or from domestic concerns that must have assistance in turning out goods. There is a decided scarcity of help in the metal trades and there appears to be no supply in sight to relieve the situation.

Alone, of all the metal trades, the jewelry industry continues dull and there are few of the manufacturers who will hazard predictions as to when there will be any material improvement than has been experienced during the past six months. There has been considerable talk about the various contracts that have been offered for small goods, such as emblem pins, etc., which have been offered and declined because of the high and uncertain price for brass, and the absence of quotations on future prices my the brass companies. That this is holding back a large amount of business is asserted by many of the manufacturers and is not denied by anyone.

H. J. Astle & Co., of this city, has been awarded the contract for placing two large ventilating fans in the plant of Denhom & Co., Worcester, Mass., each fan to be accompanied by the Boland ventilating system. The Astle company is also installing several Boland systems of various kinds for the Peerless Jewelry Company at Sherbrooke, Canada.

The Brown & Sharpe Manufacturing Company is erecting a building to be used entirely as a hospital for any of the employees who may be injured during the working hours. A trained nurse is to be on duty all the time.

The extensive plant of the Gorham Manufacturing Company at Elmwood closed down on July 23 for a two weeks' vacation. This is in accordance with the annual custom and is for stock-taking and general overhauling.—N. H. M.

BOSTON, MASS.

AUGUST 2, 1915.

While there are few concerns in Boston in metal working lines that are busy on contracts having any direct bearing upon requirements of combatants in the European war, there are reports that at Lynn and in the Hyde Park district of this city makers of machinery are interested indirectly, having orders for extra equipment for establishments making munitions or supplying other needed products to the belligerents.

That is why the workmen in such shops are particularly interested in the situation in Connecticut. The Metal Trades Council of Boston and vicinity met Sunday night July 23, and voted to support the Machinists' Union in any action it might deem necessary to obtain betterment in wages and working conditions.

The labor leaders believe that the time is opportune for the establishing of an 8-hour day in many places in New England in a number of lines of manufacture, and will try to bring this about wherever they consider the effort likely to succeed.

The General Electric Company's big plant at Lynn and ex-Governor Foss' machine works in the Hyde Park district were the places selected for initial action. There is much unrest also among engineers, electricians and those in trades allied to builders' operations.

The silver platers are somewhat busier than they were in earlier months of the year, but news of the closing of the plant of the Newburyport Silver Company comes from Keene, N. H., following the admission that it was in financial difficulties. A receiver was appointed, representing the Merchants National Bank of Boston, and the concern's affairs are to be wound up by the sale of the stock on hand and machinery.

An interesting feature in connection with business created by the war is the statement by a representative of the Tuttle Silver Company that this company is manufacturing, on special order, a number of brass instruments, known as viscometers, to be used for testing oils. Supplies of these instruments previous to the war came from Germany, and imports are not now obtainable as readily as formerly—J. S. B.

BUFFALO, N. Y.

AUGUST 2, 1915.

A more healthy tone of business the local metal men have not had the privilege to experience in a long time as was the month of July. Competition was said to be keen in this market, also that collections were very slow.

One large local concern was forced to give up the idea of accepting an $80,000,000 shell order for the Allies the other day on the ground that they were not equipped to handle this commodity. This is only one of the opportunities to knock at the local metal doors. A number of concerns are now working overtime to fill their war orders. One firm is so busy with foreign trade that they are turning down nearly all of their domestic business.

It has been months since the local foundries have been so active as they are today. And there is only one foundry in Buffalo that does not happen to enjoy this privilege and the reason for this is because they have a strike on in their foundry.

E. C. Mason has joined the sales staff of the American Bronze Company. He will travel through New York and Pennsylvania.

The local electroplaters say they have fallen into a good lot of new business which will keep them busy for some months to come without adding any new orders.

A. F. Flanders Manufacturing Company are very busy, so much so that it has necessitated the enlargement of their establishment, which is now in the process of construction.

The Washington Plating Company doubled their force of men during the past month.

The A. F. Fries Plating Company is working every department in their plant. It was only the other day that they did a very successful piece of work when they nickel plated the inside of two 500-gallon cast iron stills to be used in connection with the John Devine Company's vacuum drying apparatus.

Much activity continues to be shown in the finishing and rolling mills. Additions are being made everywhere to meet with the ever increasing volume of business, which is principally war orders.

The Buffalo Copper and Brass Rolling Mill have not experienced such a period of activity as they are now passing through in their entire history of doing business. For months they have been working on war orders, taxing their plant to the utmost. Additions have continuously been made, and the last to be made are two one-story steel shops which will cost $150,000. Not only are they increasing their plant, but also their clerical force, which has become very necessary to care for the additional amount of work. Also, it was only the other day that they placed an order with Joseph Dixon Crucible Company, of Jersey City, for 27 carloads of crucibles, which is estimated to amount to $135,000.

The Eagle Stamping Company have moved to 1400 and 1410 Niagara street.

Zero Valve and Brass Manufacturing Company report a gradual increase in their business.—G. W. G.

NIAGARA FALLS, N. Y.

AUGUST 2, 1915.

The Cataract City metal men report that the past month improvement was steady and gradual over that of a month ago. A healthier tone of market conditions has not been seen in this city for nearly a year.

The two local foundries are being taxed to their capacity with orders which are continually coming in.

It is because of this increasing volume of business that the Titanium Alloy Manufacturing Company have been obliged to increase the size of their locker and dining room, and additions made to their melting, storage and cleaning room. Also the capacity of their molding plant had to be increased. Two large Piat melting furnaces have been installed. In fact, they have doubled the area of their floor space during the past month or so, all of which is estimated will cost about $25,000 when entirely completed. This firm recently cast some worm gear wheels of Titanium aluminum bronze 16 inches in diameter to be used in large charging machines in one of the large steel mills and which proved to be a decided success, so much so that the firm gave them a repeat order.

The Frontier Brass Foundry during the past month booked a very large order calling for a large number of 900-pound copper water-cooled contact plates for the Union Carbite Company, of this city. At the present time they are casting two a day. This firm is also constructing a fair sized chemical and physical laboratory where all of their work, in the future, will be tried and tested before it leaves the plant. Albert Rhodes, a graduate of Pennsylvania State College, will be in charge. Another new feature with this firm is that they are now supplying their workmen with bottled spring water and each workman is furnished with an individual drinking cup. They are all hung up in a row and the name of workman is written over the cup.

Local electroplaters also note a decided change in local conditions. Their increase has been said to be about ten per cent. better than a month ago. And what has been just said about the electroplaters is also true about the jewelry and silverware manufacturers and stamping mills.

During the past month A. H. Wright has made over 3,000 antique copper-plated picture frames in addition to his regular work.

The Spirella Company report that their business is steadily increasing despite the abnormal conditions.

All the other local concerns, such as the Carborundum Company, Niagara Falls Stamping Works, etc., also report a slow but gradual increase over last month.—G. W. G.

CINCINNATI, OHIO

AUGUST 2, 1915.

The tide of war orders in process of handling in this vicinity, instead of falling, seems to rise, both in volume and in the speed with which the work is to be handled, and, at that, as heretofore reported, the immense size of the contracts

makes it certain that they will extend over many months, with a corresponding guarantee of activity in the trades interested. The search on the part of agents of the belligerent countries for manufacturing plants able to manufacture arms and munitions has brought into active operation concerns in lines normally quite remote from any direct relationship with such work, and it is safe to say that no manufacturer in this part of the country who is willing to make the necessary changes and additions to his equipment need be idle. The result of this on the metal trades and the men employed in them has, as a matter of course, been extremely favorable, one indication of this being the recent announcement of voluntary increases in wages on the part of several local manufacturers of machine tools, whose plants have been actively engaged for months on war orders. While it may not follow that foundrymen will do likewise, such action shows sufficiently well the extent of the profits flowing from the handling of the numerous big rush orders of the sort referred to, and, undoubtedly, the foundrymen are getting their share of the prosperity.

Of course, in view of the dullness in domestic business, which is generally felt, it is extremely fortunate that the demand for various goods in the "war order" class is so lively, as otherwise it is fairly certain that many good expert mechanics who are now working overtime with the plants which employ them would have relatively little to do. Appreciation of this fact was significantly shown in Cincinnati at a recent meeting of the central labor council, at which an attempt to push through a resolution condemning the business in munitions and supplies was voted down by a large majority, after several speakers had expressed themselves as being emphatically opposed to any move which could cut down the business now being handled here.—K. C. C.

DETROIT, MICH.

AUGUST 2, 1915.

All lines of the metal industry are reported good, and some excellent, at this time of the season, which is a condition that has not arisen for a number of years. Two elements enter into the situation, the automobile trade is one, and the other is the European war, which at first was feared would send many concerns to the wall. Happily it has worked another way and plants that have been operating in a half-hearted manner are now working to capacity. The automobile industry has never been so successful as at the present time, and thus, of course, causes a great demand for all kinds of brass and aluminum parts. Many of the factories here have in operation great brass plants and are turning out vast quantities of manufactured parts. However, such factories as the Ford Motor Works, Maxwell Works Cadillac, Packard and Studebaker Corporation are compelled to go to the smaller brass and aluminum factories for automobile parts that they are unable to produce in their own plants. The result is that many brass factories of only moderate proportions are kept extremely busy filling orders from the automobile companies. Added to this press of business, Detroit has become one of the leading centers for the manufacture of war material. It is easy to obtain the copper ore from the Upper Peninsula of Michigan, and it is still easier to manufacture it and ship it across the border into Canada. While manufacturers have little to say about the output of war materials, it is a well known fact that great quantities are being produced here. Fear of the bomb and other disasters from over zealous German sympathizers is causing manufacturers to keep what they are doing to themselves.

Taking conditions as a whole, the brass and aluminum business at this point has never been so flourishing. While failures are reported frequently, one never hears of a brass or aluminum establishment going to the wall.

Manufacturers are reporting but little in the way of additions to plants; in fact, they are too busy to engage in building operations at present, unless they are absolutely forced to it. There is, however, considerable new equipment reported being installed.

Building conditions are not brisk and as a result plumbing manufacturers are not doing a great deal. The business seems to drag with no apparent indication of a change for the better this summer.—F. I. H.

SAN FRANCISCO, CAL.

AUGUST 2, 1915.

The metal industry situation, which has occupied a more or less precarious position on this portion of the Pacific Coast for several years, shows a tendency to improve in certain respects. Naturally quiet during the summer period, the European war has entailed many difficulties, particularly among the foundries. The unprecedented demand in the East for brass for war munitions has boosted the price of this commodity far above normal. Prices for material in some instances have more than doubled in the past sixty days. The general consensus of opinion is that the Panama-Pacific Exposition is greatly going to improve business conditions among the various industries, especially in the influx of new capital which should naturally appear with the vast numbers of eastern visitors who have been coming to California for the past several months. The smaller copper and brass works are, of course, the hardest hit by the rise in the price for materials, in view of the low prices which are prevailing for the finished product. The demand for the smaller pieces in brass is about normal, as also for heavy brass castings for marine work.

The Pacific Brass & Bronze Foundry, 528 Folsom street, makers of machine castings and ornamental castings in bronze and brass, reports business as showing slightly better than it has been for several months. Prices on scrap have been remaining practically constant, red brass averaging around 13 cents and copper around 18 cents.

The Oscar Krenz Copper & Brass Works, 431 Folsom street, brass founders and finishers, say that business conditions are bright and should continue to improve. It is reported that this company has a considerably large contract under way for one of the local breweries.

W. T. Garratt & Co., 299 Fremont street, who operate one of the best equipped plants in the West, have gone largely into manufacturing for the jobbers' trade. During the past month they cast a 3,500-pound bell of pure bell metal material for St. Joseph's Church, of San Francisco. This is the largest bell which has been cast in local shops in some time. A 1,500-pound bell has been cast for the fire alarm system at Madera, Cal.

M. Greenberg Sons, 225 Beale street, report the business outlook as being good and the shop is keeping a force of twenty-five men busy. The firm manufactures plumbing supplies and does general foundry and machine work. The present high prices for metal have been interfering seriously with business. The firm has entered bids for several large pieces of work in active competition with eastern firms.

Mr. N. G. Potter, proprietor of the San Francisco Brazing & Welding Works, 131 Beale street, reports slow business, but that there are chances for its brightening up. Several large jobs of aluminum welding have recently been turned out.

The Golden Gate Brass Manufacturing Company, 48 Tehama street, reports quiet business, the high prices of metal and the general lack of confidence apparent in business circles being influential factors. There has been a great deal of delay in metal shipments from eastern points.

Mr. Carroll, manager of the San Francisco Brass Casting Company, 48 Clementina street, reports good prospects for future business. This firm does the bulk of its business with the gas engine manufacturers and pump works. While material prices have been soaring, product prices have been going down. Collections are reported as being extremely poor.

Mr. W. B. Short, manager of the foundry department of Rudger & Merle at North Beach, notes an improvement in the market for ornamental bronze goods. Contracts are being filled for the installation of the bronze work in the new City Hall and the Academy of Science in San Francisco, the Central Bank of Oakland and the Francis Carolan mansion at Burlingame. This firm is exhibiting a hand chased cast bronze canopy bedstead, valued at $5,000, in the Palace of Manufactures at the Exposition. Counter screens, bronze elevator fronts and ornamental bronze arch, bronze signs

and an ornamental panel make up an extremely interesting exhibit and which was awarded the grand prize and a gold medal by the Exposition.—A. A. W.

ATLANTA, GA.

AUGUST 2, 1915.

Atlanta, one of the premier cities of the South, is getting to be an important manufacturing center. The metal working lines are stronger than in the past and there is considerable work in brass, bronze, aluminum, tin, copper, etc., but very little in the higher class of metals, such as gold, silver, platinum, etc.

J. W. English, formerly manager of C. A. Allen's plating plant of Chicago, Ill., has opened the Atlanta Plating & Repair Works at 66 Ivy street. He has installed a first class shop, to do any kind of work.

Zinc and copper are very scarce here and both have gone way up in price. It has considerably affected the engraving business and it is said it is only a question of time when zinc will be unobtainable. Both zinc and copper have advanced about 190 per cent.

C. Blair, who was with the National Cash Register Company and the Elliott Fisher typewriter people, has opened a plant here, at 117 Edgewood avenue, to do special work in plating, welding and general metal repair work. He is making a specialty of making signs and monograms in solid copper, brass and small work in gold, silver and aluminum.

The Herty Typewriter Company, of Jacksonville, Fla., have established a galvanizing plant.

F. G. Hickey, care of the Gardener Sharpener Company, of Amarillo, Tex., wants to get in communication with manufacturers of aluminum or other metal boxes.

B. F. King, of the Newport News (Va.) Furniture and Pattern Making Manufacturing Company, desires copper and nickel plated mouldings for show cases.

The Clay Products Company of America, at Fairhope, Ala., wants prices on machinery to manufacture aluminum goods.

The American Valve Company has been organized at Bristol, Va., to build a valve plant. Lindsay Bunting is the president; Cain Godsey, vice-president; G. W. Overstreet, secretary-treasurer.

William C. Davis, of Athens, Ga., is desirous of obtaining data, prices, etc., as to a plating plant and supplies needed.—H. S.

LOUISVILLE, KY.

AUGUST 2, 1915.

Coppersmiths and metal workers of Louisville report business conditions as very quiet during July, but are feeling fairly optimistic concerning future developments. General conditions are improving somewhat, and some of the local concerns have been offered war orders for various materials, such as metallic packing, brass shells, etc. Most of the local shops are not very well equipped to handle big shell contracts, and rather than go to additional equipment expense have turned down the business. The distillery trade will undoubtedly be very light this fall, as the distillers have agreed on another fifty per cent. crop reduction for the fiscal year 1915-16. Special castings are not in as strong demand as they were, as the machine shops are not so busy. The demand for special bronze bearings for automobiles and motorcycles is increasing steadily as the number of old machines on the market become larger. The local machine shops in many cases handle the work instead of the owners having to send to the factories to get the parts.

There has been no change in sheet copper during the month, although rolled copper and bar copper advanced a half cent on July 12. Quotations are: Anodes, 23 cents; bar and rolled, 24 cents; sheet copper, 25 cents. These prices are expected to remain firm during the month.

Hines & Ritchey, of Louisville, were recently offered a contract to make about $45,000 worth of five-inch brass shells, which were for the allied armies. The firm was not in position to handle the business without making enlargements, and decided to pass up the contract. Other lines are holding up fairly well, but are not expected to increase materially until later in the fall, when distillery work will probably pick up somewhat.

J. W. Rademaker, manager of the Independent Brass Foundry, reports that business is very quiet just now, and that the shop is practically idle for the time being.

The Vendome Copper & Brass Works is one of the busiest shops in Louisville just now. The concern is completing some big distillery work in the far South, and has a big deal on which will probably be closed shortly. If this deal is closed the company may enlarge its plant to take care of the additional work.

One of the most interesting developments in the trade was the recent consolidation of the Rindt company with the E. A. Stege Manufacturing Company. The Rindt concern was formerly the Art Brass and Plating Works, but for the past two years has been operated under the Rindt title. The Stege concern was one of the oldest plating and brass works in the city. The new concern is known as the Stege-Rindt Plating Company and is capitalized at $11,000. The incorporators are: George W. Stege, secretary-treasurer; Louis C. Stege, vice-president; Louis Rindt, president, and Carl Rindt and Captain C. F. Huhlein, president of B. F. Avery & Sons, are on the board of directors. The Stege plant on Jefferson street has been closed and the Fifth street plant of the Rindt concern has been utilized. Some of the old machinery from both plants will be sold. The Rindt concern, which manufactured electric and gasoline irons, along with other brass goods, discontinued this line recently, as the selling end of the business was so expensive to handle that the profits were practically nil.—J. D. C.

TRENTON, N. J.

AUGUST 2, 1915.

Midsummer finds the metal industry a little more active at some of the plants here and the making of war munitions has caused one plant to engage additional help. Another plant is being rebuilt after a serious fire and this will give additional work to men along the copper lines. The Jordan L. Mott Company, which recently accepted a contract calling for $5,000,000 worth of ammunition for the Allies, is now busily engaged in turning out the same. The brass material is being made in different ways. Some of the fuse is being cut from long and thick bars and turned into proper shape, while some is being cast. New oil furnaces for this purpose were recently installed in a new building and the deadly ammunition is being finished in the basement, where only those engaged in that work are allowed to go. Tool makers are working nights at the big plant manufacturing the necessary instruments. Turners employed on the new automatic machines and mechanics operating the lathes in the drill room are also working overtime. Mechanics, who only worked part time during the past winter, find plenty of work and are making good wages. Many tons of brass will be used for the munitions, six tons having recently been shipped to the Mott plant.

The Mott company has been obliged to police its plant like a modern fortress. Armed men, sworn in as deputies and watchmen, guard the plant night and day. The police work in three shifts of eight hours each and do duty both inside and out of the big grounds. Visitors who have business at the plant during the day must first pass a guard, and after getting permission from the kate keepers have to fill out and sign blanks stating their business.

The Billingham Brass and Machine Company is busy with a general line of work besides turning out considerable material for government ships. President Philip Billingham says the fall prospects are very good and he expects to continue being busy. The John A. Roebling's Sons Company has begun work on its new $150,000 copper cable shop in South Trenton. This department was destroyed by fire last winter, causing a loss of more than $1,000,000. After the work was transferred to smaller quarters some of the Roebling orders were taken over by Perth Amboy manufacturing plants. The Roeblings have lately been buying quite a good deal of copper.

The National Electro Plating Works finds business picking up a little, but not up to the standard. The Ingersoll-Trenton

Watch Company is operating some of its departments at nights.

Daniel J. Bechtel, of the Bechtel Engraving Company, finds business decreasing slightly after a busy month or two. The plant has been turning out many copper and bronze tablets. The Trenton Brass and Machine Company is busy turning out a general line of work, and there is enough work on hand to keep the plant running on full time for several months.

The war prices now prevailing for many metals, owing to the great demand from the conflict in Europe, is bringing unprecedented trading in zinc from the mines in Sussex County, N. J. According to figures furnished to State Geologist Henry B. Kummel, of Trenton, by the New Jersey Zinc Company, there were hoisted during 1914 at the Great Franklin Furnace mine 489,230 net tons of zinc ore. So great was the demand that in addition to this, 29,458 tons of low-grade ore were recovered from the mine's dump and shipped, the increased prices warranting this.—C. A. L.

NEWARK, N. J.

AUGUST 2, 1915.

Business, taken all in all, seems to be making steady progress, but this progress is so slow that the field as a whole has to be surveyed and compared with what it was a few months ago in order to realize that there has been real progress. Many manufacturers report that business is very quiet and that they can see no prospect in the near future of any great improvement. The only real life discovered is where war orders are being filled or goods are being made for those who are filling such orders. While it is difficult to find just who is making war material, as many so employed are doing it quietly and without comment, there is evidence that each passing week sees larger and larger quantities of this class of goods made. It is even rumored that a local jewelry manufacturing concern has been filling a large foreign order for medals, the country purchasing them not desiring the medals themselves, but using this way to get the metal into the country, whereupon it is melted up and used in making war material there. The great demand for spelter and other metals used in the manufacture of ammunition keeps the price of these materials so high that manufacturers of legitimate metal goods cannot make their customary goods at old prices. Consequently many who want such goods have curtailed their orders, hoping that the price will soon come down. Thus war orders have tended to hold up legitimate trade and caused many concerns to be slack, while at the same time many of their customers need and are ready to buy the goods they make, as soon as the prices come within reasonable bounds. Fear of what may develop in the international situation is also a check on business. Scores of manufacturers would branch out and take a chance if there were reasonable grounds for feeling that they could dispose of their increased products. All business is being conducted on such a conservative basis, however, that no one wants to make the break. Consequently all are "sitting tight" doing just what they feel they can dispose of, and waiting for something to happen which will create general confidence in the business world. They are all conserving their money and energies for the time when business is freed from the shackles of fear and conservatism. Notwithstanding the fact that business is so quiet in many lines that it seems almost at a standstill, Newark manufacturers as a whole are turning out in the aggregate a little more than they were a month ago, money is a little easier and there is a growing feeling among many that, barring the introduction of any event of international importance to cause a decided check in business, there will be better business the coming fall than for a long time before. The banks are full of money, and while the officials of these institutions are very conservative in giving it out at the present, they are beginning to encourage business by modifying somewhat their rigidness in the matter of loans. There are unusually large deposits in the saving banks, showing that the rank and file are not spending their money as freely as usual, pending further developments. A great deal of this will be put into circulation as soon as confidence is restored.

The plant formerly owned by the Renziehausen Company at 43-47 Oliver street, which company went bankrupt several months ago, has been purchased by the Dirigold and Metals Company, a New Jersey Corporation, from the Heer-Scofield Company, of Baltimore, which purchased the plant at the time of the bankruptcy proceedings. The Dirigold and Metals Company is the owner of the metal known as "Cupror," and also of the finished product which goes under the name of "Dirigold," and which consists of flatware, candlesticks, etc. The firm's trade mark is "Dirigold 1914." Extensive additions and improvements to the plant have been made for the handling of precious metals, refining and sweep smelting, and for the rolling of silver anodes, sterling silver sheet, wire and silver solder. The president of the concern is W. W. Gage, and the treasurer and general manager is Russel S. Davis.

Slightly improved business is reported at the office of M. T. Goldsmith, manufacturer of gold and silver goods at 532 Mulberry street.

Because of the important part which Newark inventors have taken in the development of the industrial life of this city, it is urged that considerable prominence be given Newark inventors and inventions at the industrial exposition which will be held in the First Regiment Armory, Sussex avenue and Jay street, during September, 1916, in connection with the celebration of the 250th anniversary of the founding of Newark. The committee in charge of the arrangements for the exposition have laid tentative plans for the greatest demonstration of the city's industrial growth ever produced. The exhibits will be essentially local and will probably be arranged according to industries, rather than as individual concerns. As far as possible, processes of manufacture will be shown.

Baker & Co., platinum, gold and silver refiners at Austin and Murray streets and New Jersey Railroad avenue, reports that business is very quiet just now. Part of this slackness with this concern is due to the fact that all of the jewelry factories and some other metal factories closed for their annual or semi-annual overhaulings the early part of July. The firm expects better business a little later.

The Electrolytic Metals Company, Inc., of New York, has incorporated as a foreign corporation in New Jersey, with Raymond Mintz, of 377 Frelinghausen avenue, this city, as its agent.

The J. J. Jackson Company, 156 Astor street, reports that business is improving some, there being quite a demand at the present for fireless silver. The company is rolling a considerable amount of silver, and is doing much extra rolling of other metals.

Landosky Bros., silver, nickel, brass and copper plating and polishing, 24 Mechanic street, reports that business is very fair but that collections are hard. W. H. Bergfels, of the Newark Nickel Plating Company, 38-40 Walnut street, also reports that business is very quiet and collections very slow. He states that whatever activity there is can be traced back to war orders.

William Yeager, of Yeager Bros., Mulberry street, nickel plating, oxidizing and lacquering, states that business is quiet, there being just about enough to keep their head above water. He has found collections fair.

T. Knight, enameler and japanner at Runyon street and Sherman avenue, states: "We are doing remarkably well considering the war on the other side. We formerly did a large amount of work for several typewriter concerns, whose machines were exported to Europe. When the war came this trade was almost entirely stopped, and we had to find new business elsewhere for the present. Most of the work we are now doing, therefore, is small work secured from new sources, and while it is not as large as we are accustomed to do, we consider it very good under the circumstances."

B. J. Riley, of the B. J. Riley Manufacturing Company, 251 New Jersey Railroad avenue, manufacturers of metal goods and novelties, reports that business is still slow. The factory is still running ten hours, but more could be done than is.

The J. L. Sommer Manufacturing Company, manufacturers of metal novelties at 97 Chestnut street, has secured an additional floor, now occupying a large part of the third floor of the building, as well as the second floor.

The Merigold Electro Plating Company, 97 Chestnut street, reports that business continues to be slow, though there were quite a few orders to fill upon opening from the annual shutdown for repairs, etc.—R. B. M.

NEWS OF THE METAL INDUSTRY GATHERED FROM SCATTERED SOURCES

The Cleveland Metal Products Company, Cleveland, Ohio, will enlarge its plant by the erection of a two-story office building 60 x 92 feet.

The Magnesium Manufacturing Company, Rumford, Me., will build a one-story, brick and steel factory on Railroad street. Robert M. Keeney is superintendent.

The Chase Metal Works, manufacturer of printers' brass, etc., Waterbury, Conn., will build an addition, 60 x 200 feet, of brick and steel, to their plant on Thomaston avenue.

Clifton Plating and Manufacturing Company will start work on the construction of a two-story, 40 x 40 feet, addition to its plant at 113 West Main street, Springfield, Ohio. Estimated cost, $3,000.

R. H. Evans, for many years associated with the Frictionless Metal Company, Chattanooga, Tenn., has resigned to accept a similar position with the Michigan Smelting and Refining Company, of Detroit, Mich.

William C. McGrath, for the past twelve years superintendent of the rolling mill at the Bridgeport Brass Company, Bridgeport, Conn., has severed his connection with that company to accept a position in the same capacity with the Kennedy & Stroh Corporation of Oakmont, Pa.

The Bossert Manufacturing Company, Utica, N. Y., has started the erection of a one-story building, 34 x 90 feet, for a nickel plating and polishing department, one-story addition, 25 x 100 feet, to its trimming department and a building, 120 x 22 feet, for a press room.

The Mauston Aluminum Company, Mauston, Wis., manufacturer of kitchen utensils and drawn work, has disposed of its equipment, material, stocks and good will to the Aluminum Specialty Company, who have moved the machinery from Mauston to Manitowoc, Wis.

The Huntington Alloy Company, Huntington, W. Va., have been organized to manufacture alloys of various metals and to build a plant to cost $25,000. The men at the head of the company are Paul Hardy, R. Paleshire, C. P. Donovan, George W. Harrold and Thomas W. Harvey.

The Abbott Ball Company, manufacturers of tumbling barrels, etc., Hartford (Elmwood), Conn., are erecting an addition to their plant, 20 x 80 feet. This company is running twenty-four hours a day with two shifts of hands and they announce that they have contracted for more machinery.

The E. W. Bliss Company, 11 Adams street, New York, N. Y., manufacturers of metal working machinery, announce that the published report that they will build a machine shop at Sag Harbor, N. Y., is incorrect. The company will build a small shed and dock at Sag Harbor for the storage and handling of torpedoes.

James H. Rhodes & Co., manufacturers of Carlsruhe cleanser, potash, pumice stone, etc., New York, N. Y., have just purchased a five-story office building and property at 157 West Austin avenue, Chicago, Ill. The company expects to move into it about May 1, 1916, and that this step has been taken in order to accommodate their increasing trade.

The Hewitt Bearing Metal Company, of Newark, N. J., manufacturer of brass and bronze castings and specializing in the Hewitt bearing bronze, whose plant was recently destroyed by fire, is erecting a new, up-to-date, fireproof foundry. The new plant, when completed, will not only be double in capacity, but will also be equipped with all the latest machinery, which will facilitate handling the output more efficiently than ever before.

The Sterling Blower Company, manufacturers of blowers and blower systems of all descriptions, Hartford, Conn., which has been located in the west armory building of the Colt's Patent Fire Arms Company, which has been taken over by the owner to provide extra manufacturing space, has purchased the former Hartford Foundry Corporation plant. The purchase includes a lot, 150 x 550 feet, and a one-story foundry, 60 x 300 feet. About $15,000 will be spent in renovating the plant.

The business of the Vacuum Specialty Company, manufacturers of vacuum bottles, etc., Vineland, N. J., will shortly be transferred from that place to its plant at Meriden, Conn., and continued under more favorable conditions than ever. The marketing of the output of the Vacuum Specialty Company will be through Manning, Bowman & Co., manufacturers of nickel and silver plate, Meriden, Conn. All communications should be addressed to the Vacuum Specialty Company, Meriden, Conn.

The Aluminum Goods Manufacturing Company, Two Rivers, Wis., is installing a 500 horsepower Vilter unit to replace an engine damaged two weeks ago. The new engine is direct-connected to the rolls instead of being operated through gears and belts. A large roll was also wrecked and required replacement. It was built two years ago and even with the added facilities the company has been unable for several months to cope with its rolled material requirements. The accident interfered seriously with the production, but provision is made in the replacements to largely increase the former output.

The Chicago Bearing Metal Company, of Chicago, Ill., have contracted for the installation of a Snyder electric furnace for melting brass. This furnace will have a twelve-hour capacity of 5,000 pounds. It is to be installed under guarantees as to operating cost and loss by volatilization. Losses by volatilization in oil fired furnaces form one of the largest melting expenses. The Snyder Electric Furnace Company, Monadnock building, Chicago, Ill., are willing to guarantee that the loss by volatilization in Snyder electric furnaces will not exceed 1½ per cent. and they claim that in actual operation the loss will run well below this guarantee.

The Watson-Stillman Company, operating a brass and bronze foundry, brass machine shop and grinding room at Aldene, N. J., will begin work at once on an addition to its plant, 60 x 100 feet, containing two galleries, 30 x 60 feet each. The building will be used as an erecting shop and is to be completed by September 1. No new equipment will be required. The company has just booked an order from England for a large metal extruding press, with all hydraulic equipment. Presses of this kind have heretofore been bought in Germany by English manufacturers. The Watson-Stillman Company are also building two for domestic delivery.

REMOVALS

George I. Onions, of Buffalo, N. Y., has removed his plating establishment from 235 Summit avenue to 1400 Niagara street.

James H. Rhodes & Company, Manufacturers of Carlsruhe cleanser, New York, N. Y., recently removed its office from 85 Front street to 162 William street.

The Max Ams Machine Company, manufacturers of presses, dies and special machinery, has moved its plant from Mount Vernon, N. Y., to Bridgeport, Conn.

BUSINESS TROUBLES

Pursuant to an order of the United States District Court, Northern District of New York, G. L. Prescott, trustee in bankruptcy, the Rome Bronze Company, Rome, N. Y., was to sell at a public sale the personal property of the bankrupt on July 30, but at the time of going to press there are no particulars available as to what transpired at the sale.

BUSINESS CHANGES

W. E. Oakley, vice-president and general manager of the Bayonne Casting Company, producers of Monel metal, Bayonne, N. J., severed his connection with the company July 1. Mr. Oakley has been succeeded by J. F. McNamara as general manager and other changes have been made throughout the factory and office, which will assure the company's customers prompt and satisfactory service.

INCREASE IN CAPITAL STOCK

The Indiana Brass Company, Frankfort, Ind., has increased its capital stock from $10,000 to $25,000.

The Jackson Iron and Bronze Works, Jackson, Tenn., have increased their capital to $50,000 and will make steel, iron and bronze work. I. A. Rainey is the manager.

The General Aluminum and Brass Manufacturing Company, Detroit, Mich., manufacturer of aluminum and brass castings, has increased its capital stock from $150,000 to $400,000.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators and their residence. Particulars of additional incorporations may frequently be found in the "Trade News" columns.

To operate a plating and stamping business.—The Toledo Electro Plating & Stamping Company, Toledo, Ohio. Capital, $50,000.

To manufacture novelties.—E. Conlan & Co., Newark, N. J. Capital, $150,000. Incorporators: Mary A. Clements, Bernard Conlan, Margaret Daly, Joseph Conlan, all of Newark.

To manufacture aluminum goods.—The Greentown Aluminum Company, Greentown, Ohio. Capital, $25,000. Incorporators: A. C. Myers, Claude K. Donat, F. O. Boston, Harvey O. Weary and R. P. Hoover.

To deal in machinery for the pressing and stamping of sheet metal.—The Perfection Manufacturing Company, New Brunswick, N. J. Capital, $16,000. Incorporators: Leslie P. Johnson, John Watson and August C. Streitwolf.

To manufacture metal parts.—Simmons Metal Goods Company, 1122 Superior avenue, Cleveland, Ohio. Capital, $25,000. Incorporators: D. Hilden and J. W. Simmons. The company will operate a brass, bronze and aluminum foundry, brass machine shop, grinding room and stamping and brazing department.

To deal in metal stampings.—The Northwestern Metal Spinning and Brass Manufacturing Company, Chicago, Ill. Capital, $2,500. Incorporators: William Glowacki, Alexander Korwel and George H. Mallin. A plating, polishing and stamping department are among the different branches operated by this company.

FOREIGN TRADE OPPORTUNITIES

For addresses of these enquiries apply to Bureau of Foreign and Domestic Commerce, Washington, D. C., and give file numbers.

Metals, No. 16,641.—Supplementing Foreign Trade Opportunity No. 15,147, an American consular officer in Italy reports that the business man referred to in this opportunity has not received satisfactory replies to his request for quotations, etc., on lead, nickel, zinc, pewter and brass in blocks and pigs.

Galvanized sheeting and piping, No. 17589.—An American consular officer in the East Indies requests catalogs, price lists, discount sheet, etc., of galvanized sheeting and piping to be sent him at once. The grade of material should be particularly suited to withstand severe tropical weather.

Zinc sheets, brass, etc., No. 17569.—A manufacturer of toys and musical instruments in Spain informs an American consular officer that he desires to purchase nickeled sheet zinc, ranging from 0.15 to 0.70 millimeters in thickness; ordinary sheet zinc, 1 to 3 millimeters thick; tempered sheet brass, 0.30 to 0.70 millimeters in thickness, and white metal, 25 to 70 millimeters in thickness. The party states that he is prepared to pay cash on delivery and desires quotations c. i. f. destination.

INQUIRIES AND OPPORTUNITIES

Under the directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

PRINTED MATTER

Galvanizing.—The Meaker Company, Chicago, Ill., manufacturers of galvanizing machines, have issued a little booklet called "The Live Issue in the Galvanizing Industry." This booklet describes the various features and advantages of the Meaker apparatus and process for cold or electro-galvanizing.

Graphite.—The reproduction of the cover design, "The Pour," of the June issue of "Graphite," a little journal published by the Joseph Dixon Crucible Company, Jersey City, N. J., which appeared in THE METAL INDUSTRY for June, should have been credited to the Damascus Bronze Company, Pittsburgh, Pa.

Lubrication.—The Apothecaries Hall Company, Waterbury, Conn., have issued a little booklet, "Facts About Lubricating," in which they give a lucid explanation of what friction and lubrication are and then they go on and describe the various products they handle for securing proper lubrication for all kinds of machinery. Copies will be sent upon request.

Motor-Generator Sets.—Bulletin No. 42,552, entitled Motor-Generator Sets, has just been issued by the General Electric Company, and is an attractive publication of twenty-eight pages, inclosed in a designed cover and containing numerous illustrations of various types of motor-generator sets designed and manufactured by that company. There is included a general description of this type of apparatus.

Monel Metal.—The International Nickel Company, New York, N. Y., have issued a new booklet giving a full description of the characteristics of Monel Metal and also some of the uses to which this metal has been found adaptable. The booklet also includes the results of tests on rods and castings and the specifications for Monel Metal issued by the United States Navy.

Foundry Exhibition.—The Foundry and Machine Exhibi- Company, Chicago, Ill., have issued a very attractive calendar hanger calling the attention of the metal industries to the exhibition of foundry and machine supplies and convention of Foundrymen at Atlantic City, N. J., September 25 to October 1. For particulars relating to this exhibition address the Foundry and Machine Exhibition Company, 1849 West Madison street, Chicago, Ill.

Titanium Bronze.—The Titanium Alloys Manufacturing Company, bronze department, Niagara Falls, N. Y., have issued a booklet of information regarding Titanium aluminum and other standard bronze castings. This company has endeavored to eliminate the element of secrecy which usually arises in the founding of non-ferrous metals and to this end

they have printed the approximate composition of the various alloys. Purchasers of brass and bronze will find this information in very compact form and very complete and interesting.

Graphite Brushes.—Operators of electric power machinery are interested in the subject of commutation and are fully aware of its importance in the electrical field. A large percentage of breakdowns in the present day motor or generator must be charged against improper operation of commutator and brushes. Graphite brushes are designed and marketed with the express purpose of reducing commutator troubles to a minimum. A booklet, "Dixon's Graphite Brushes," explains how the characteristic lubricating qualities of graphite are utilized to this end. A copy of the booklet may be obtained free upon request from the Joseph Dixon Crucible Company, Jersey City, N. J.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

METAL MARKET REVIEW

NEW YORK, August 2, 1915.

COPPER.

Since the first of July the copper market has steadily weakened and prices have declined. Some of the larger producers were holding for 20½ delivered for Electrolytic, while others were sellers at 20¼. There was very little business at these prices and the actual market prices for copper were made by dealers and sellers of second hand lots. On July 1 electrolytic was quoted at 19⅝ cents cash New York and by the last week in July there were sellers of electrolytic at close to 1¼ cents per pound lower, or at 18¼ cash New York, for any delivery up to January or February.

The price of copper in London has declined from £80 5s. for spot standard on July 1 to £71 5s. at the close and electrolytic has declined from £94 10s. to £87 10s.

Consumers have stayed out of the market except for some small actual needs and there have been practically no sales for export account during the entire month.

The London speculative market is no longer a factor in copper prices for the reason that the British Government has virtually prohibited all speculation in metals. The only demand for copper now in England is for war material and the stocks of refined copper in England and France seem to keep about normal.

The exports for the month are very small and will total only about 15,000 tons, against 34,145 tons a year ago.

There has been no buying of copper since the middle of June and the stocks of copper have probably increased considerably during the month of July.

Prices today are more or less nominal, Lake 18½ to 18¾ cents, electrolytic 18¼ to 18½c. and casting 17 to 17¼.

TIN.

The price of pig tin has declined in line with all other metals. Opening at around 39¼ cents, price has steadily declined about 4 cents per pound to 35½ cents at the close. The consumption has been good and the decline has come entirely from the London market.

Five-ton lots are quoted 35½ cents futures, about ½ cent per pound lower.

LEAD.

The trust has held steadily to the 5.75 New York price until July 30 when the price was reduced ¼c. to 5.50, but the outside market has been dull and easier and today prices by the independents are 25 points lower than the trust price, and the market is quotable at 5.25 New York carload lots.

SPELTER.

The price of spelter has declined over 3 cents per pound during July in the home market from 22¼ at the opening to 18¼ cents at the close. The price of spelter in London has declined from £100 to £92 10s. at the close. Sheet zinc has been reduced 3 cents per pound to 24 cents f. o. b. mill.

ANTIMONY.

The Antimony market has held fairly steady and prices are about one cent per pound lower than a month ago. Chinese or Japanese antimony is quoted at around 35½ cents today. Market very dull.

ALUMINUM.

The aluminum market has been very dull and prices are about the same as a month ago. Ingots, 98 to 99 per cent., are quoted at 32 to 33 cents, according to quantity.

SILVER.

There has been hardly any change in the price of silver during the month. Opening at 48¼ cents, prices have fluctuated about ½ cent to 46⅞ cents at the close.

QUICKSILVER.

The wholesale price of quicksilver was $90 to $95 per flask on July 1, and closes at $92 to $94 per flask, according to quantity.

PLATINUM.

The market has been very dull and prices are unchanged, $40 per ounce for ordinary refined to $42 for 10 per cent. hard.

SHEET METALS.

The price of ingot copper has declined nearly 2 cents per pound and spelter about 4 cents, but the price of brass and sheet copper has been reduced probably about ½ cent per pound. The American Brass Company have withdrawn all prices for publication. There is no regular basis for prices now on account of the absolute necessity for war munitions. Sheet copper is quoted at around 24 cents, high sheet brass 28 cents, seamless brass tubing 32½ cents, seamless copper tubing 30½ cents. Copper wire is obtainable at 20 cents base.

OLD METALS.

The market for old metals is dull and weak, owing to the decline in ingot metals. The export business has fallen off. Prices of copper scrap have declined 1½ cents per pound, the only metal that is at all active today is aluminum scrap; the rest of the market is very dull.—J. J. A.

JULY MOVEMENTS IN METALS

	Highest.	Lowest.	Closing.
COPPER.			
Lake	20.50	18.75	18.75
Electrolytic	20.50	18.25	18.25
Casting	18.25	17.00	17.00
TIN	39.25	35.50	35.50
LEAD	5.75	5.50	5.50
SPELTER	22.25	18.25	18.25
ANTIMONY (Chinese and Jap)	36.00	35.25	35.25
SILVER	48¼	46⅞	46⅞

WATERBURY AVERAGE

The average prices of Lake Copper and Brass Mill Spelter per pound as determined monthly at Waterbury, Conn.:

1913—Average for year, 15.83. 1914—Average for year, 13.91. 1915—January, 14⅛. February, 15.25. March, 15.75. April, 18.50. May, 22.50. June, 22.50 July, 22.25.

Brass Mill Spelter. 1915—January, 6.55; February, 11.85; March, 12.15. April, 13.85. May, 20.55. June, 25.60. July, 24.90.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street New York.

Metal Prices, August 2, 1915

NEW METALS.

	Price per lb. Cents.
COPPER—DUTY FREE. PLATE, BAR, INGOT AND OLD COPPER.	
Manufactured 5 per centum.	
Lake, carload lots, nominal	18.75
Electrolytic, carload lots	18.25
Casting, carload lots	17.00
TIN—Duty Free.	
Straits of Malacca, carload lots	35.50
LEAD—Duty Pig, Bars and Old, 25%; pipe and sheets, 20%. Pig lead, carload lots	5.50
SPELTER—Duty 15%.	
Brass Special	18.00 to 18.25
Prime Western, carload lots, nominal	22.50
ALUMINUM—Duty Crude, 2c. per lb. Plates, sheets, bars and rods, 3½c. per lb.	
Small lots, f. o. b. factory	37.00
100 lb. lots, f. o. b. factory	35.00
Tons lots, f. o. b. factory	33.00
ANTIMONY—Duty free.	
Cookson's cask lots, nominal	....
Hallett's cask lots, nominal	....
Hungarian grade	35.00 to 35.50
NICKEL—Duty Ingot, 10%. Sheet, strip and wire 20% ad. valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	48.00 to 50.00
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL	nominal
MAGNESIUM METAL—Duty 25% ad valorem (100 lb. lots)	$3.00 to $4.00
BISMUTH—Duty free	3.00
CADMIUM—Duty free	1.90
CHROMIUM METAL—Duty free	.75
COBALT—97% pure	2.00
QUICKSILVER—Duty, 10% per flask	100.00
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	39@50
SILVER—Government assay—Duty free	46@78

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% ... according to quantity	29 to 31
Silicon Copper, 20% ... " "	31 to 34
Silicon Copper, 30% guaranteed. " "	33 to 38
Phosphor Copper, guaranteed 15% " "	28 to 32
Phosphor Copper, guaranteed 10% " "	27 to 30
Manganese Copper, 30% ... " "	27 to 30
Phosphor Tin, guaranteed 5% ... " "	58 to 61
Phosphor Tin, no guarantee ... " "	46 to 49
Brass Ingot, Yellow ... " "	14½ to 15½
Brass Ingot Red ... " "	14 to 15½
Bronze Ingot ... " "	15½ to 16½
Manganese Bronze Ingots ... " "	23½ to 27
Phosphor Bronze ... " "	18 to 19½
Casting Aluminum Alloys ... " "	16 to 18

PHOSPHORUS—Duty free.

According to quantity	30	to 35

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
15.00 to 15.50	Heavy Cut Copper	17.00 to 17.50
15.00 to 15.25	Copper Wire	16.50 to 17.00
14.00 to 14.50	Light Copper	15.00 to 15.50
13.50 to 14.00	Heavy Mach. Comp.	15.00 to 15.50
10.50 to 11.00	Heavy Brass	12.00 to 12.50
8.50 to 9.00	Light Brass	10.00 to 10.50
11.50 to 12.00	No. 1 Yellow Brass Turnings	13.50 to 14.00
9.50 to 10.50	No. 1 Comp. Turnings	11.50 to 12.00
4.00 to	Heavy Lead	.... to 4.50
12.00 to	Zinc Scrap	.... to 12.50
5.50 to 6.50	Scrap Aluminum Turnings	9.00 to 12.00
11.50 to 12.00	Scrap Aluminum, cast alloyed	15.00 to 16.00
13.00 to 14.00	Scrap Aluminum, sheet (new)	18.00 to 19.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
17.00 to 23.00	Old Nickel	17.00 to 23.00

PRICES OF SHEET COPPER.

BASE PRICE, 24.50 Cents per Lb. Net.

SIZE OF SHEETS. Width.	LENGTH.	64 oz. and over.	32 oz. to 64 oz.	24 oz. up to 32 oz.	16 oz. up to 24 oz.	15 oz.	14 oz.	13 oz.	12 oz.	11 oz.
		Extras in Cents per Pound for Sizes and Weights Other than Base.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	½	1	1½	2	2½
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	½	1	2	3	4½
	Longer than 96 inches. Not longer than 120 inches.	"	"	½	1	2	3	5	7	—
	Longer than 120 ins.	"	"	1	1½					
Wider than 30 ins., but not wider than 36 inches.	Not longer than 72 inches.	"	"	Base	Base	1	2	3	4	6
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	2	4	6	8
	Longer than 96 inches. Not longer than 120 inches.	"	"	1	2	3	4			
	Longer than 120 inches.	"	1	2	3					
Wider than 36 ins., but not wider than 48 inches.	Not longer than 72 inches.	"	Base	1	2	3	4	6	8	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	4	5	7	9	—
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	6	9			
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins., but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	5	7	9	11	—
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	7	10			
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins., but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins., but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Not longer than 120 inches.	3	5	9						
Wider than 108 ins., but not wider than 120 ins.	Not longer than 120 inches.	4	6							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, 8 IN. DIAMETER AND LARGER, SEGMENTS AND PATTERN SHEETS, advance per pound over prices of Sheet Copper required to cut them from ..... 8c.

CIRCLES LESS THAN 8 IN. DIAMETER, advance per pound over prices of Sheet Copper required to cut them from ..... 5c.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot and heavier, advance per pound over foregoing prices ..... 1c.

COLD OR HARD ROLLED COPPER, lighter than 14 oz. per square foot, advance per pound over foregoing prices ..... 2c.

COLD ROLLED ANNEALED COPPER, the same price as Cold Rolled Copper.

ALL POLISHED COPPER, 20 in. wide and under, advance per square foot over the price of Cold Rolled Copper ..... 1c.

ALL POLISHED COPPER, over 20 in. wide, advance per square foot over the price of Cold Rolled Copper ..... 2c.

For Polishing both sides, double the above price.

The Polishing extra for Circles and Segments to be charged on the full size of the sheet from which they are cut.

COLD ROLLED COPPER, prepared suitable for polishing, same prices and extras as Polished Copper.

ALL PLANISHED COPPER, advance per square foot over the prices for Polished Copper ..... 1c.

ZINC— Duty, sheet, 15%.

	Cents per lb.
Carload lots, standard sizes and gauges, at mill....24 cent basis, less	8%
Casks, jobbers' prices	26
Open casks, jobbers' prices	28

Metal Prices, August 2, 1915

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect July 2, 1915

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.26⅝	$0.26½	$0.26⅞
Wire	.26¾	.27	.27⅛
Rod	.26⅝	.27	.27⅛
Brazed tubing	.30¾	—	.33½
Open seam tubing	.30¾	—	.33½
Angles and channels	.30¾	—	.33½

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.28⅛	$0.28½	$0.28⅝
Wire	.28½	.29	.29⅝
Rod	.28⅝	.29	.30
Brazed tubing	.32¼	—	.35½
Open seam tubing	.32¼	—	.35½
Angles and channels	.32¼	—	.35½

[Note.—Net extras for quality for both sections of above metal prices are not quoted due to the fluctuations in the price of zinc.—Ed.]

BARE COPPER WIRE—CARLOAD LOTS.

20c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	24c.	per lb. base
100 lbs. to 300 lbs. in one order	24½c.	" " "
Less than 100 lbs. in one order	26c.	" " "

PRICES FOR SEAMLESS BRASS AND COPPER TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 32½c. per lb.
Seamless Copper Tubing, 30½c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe sizes with price per pound.

⅛	¼	⅜	½	⅝	1	1¼	1½	2	2½	3	3½	4	4½	5	6
40½	39½	34½	33½	32½	32½	32½	32½	32½	32½	32½	33½	34½	36½	38½	39½

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet— Brass.	Bronze.
¼ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1⅛ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount, 10%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Red	34c.	net base
Muntz or Yellow Metal Sheathing (14" x 48")	30½c.	" "
" " " " Rectangular sheets other than Sheathing	32c.	" "
" " " " Rod	30½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 38½c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturer.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Sheet Block Tin—18" wide or less. No. 26 B. & S. Gauge or thicker. 100 lbs. or more 5c. over Pig Tin. 50 to 100 lbs. 6c. over, 25 to 50 lbs. 8c. over, less than 25 lbs. 10c. over.

No. 1 Britannia—18" wide or less. No. 26 B. & S. Gauge or thicker, 100 lbs. or more 4c. over Pig Tin. 50 to 100 lbs. 5c. over, 25 to 50 lbs. 7c. over, less 25 lbs. 9c. over.

Above prices f. o. b. mill.

Prices on wider or thinner metal on request.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

Gauge.	Width. Inches.	1 ton.	50 to 2,000 lbs.	Less than 50 lbs.
20 and heavier	3-30	25.9	26c.	29c.
	3-30	26.9	27c.	30c.
21 to 24 inclusive	30-48	28.9	29c.	32c.
	48-60	31.9	32c.	35c.
25 to 26	3-30	27.9	28c.	31c.
	30-48	29.9	30c.	33c.
27	3-30	28.9	29c.	32c.
	30-48	31.9	32c.	35c.
28	3-30	29.9	30c.	33c.
	30-48	32.9	33c.	36c.
29	3-30	30.9	31c.	34c.
	30-48	34.9	35c.	38c.
30	3-30	31.9	32c.	35c.

The above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. No charge for boxing. F. O. B. Mill.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 22 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.	116	..	45	38	33	32	31	29	28	29	29	29	36	37	45	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..
24.	.022.	187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Price per lb. over 25 lbs., Diameter, B. & S. Gauge, No. 000 to 10 and 12, 26 cents. No. 12 to 20 inch, 28 cents.

BASE PRICE GRADE "B" GERMAN SILVER SHEET METAL.

Quality.	Net per lb.	Quality.	Net per lb.
5%	34c.	16%	38c.
8%	35½c.	18%	38½c.
10%	36c.	20%	41c.
12%	37c.	25%	49c.
15%	37½c.	30%	54c.

GERMAN SILVER WIRE.

Quality.	Net per lb.	Quality.	Net per lb.
5%	36c.	15%	42¾c.
8%	38c.	16%	43¼c.
10%	39¼c.	18%	45¼c.
12%	41¼c.	30%	60½c.

The above Base Prices are subject to additions for extras as per lists printed in Brass Manufacturers' Price List and from such extras 50% discount will be allowed. The above base prices and discounts are named only to wholesale buyers who purchase in good quantities. Prices on small lots are considerably higher.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 1c. below to 4c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.